Continuing Education Class
Diesel Retraining

I. Orientation
- **A. Expectations**
- **B. Class Register**
- **C. Pre-Test**

II. Diesel Technology
- **A. Diesel Engine Principles**
  - **1. Review four-cycle system**
    - **a. handout**
    - **b. overhead**
  - **2. Intake System**
    - **a. handout**
    - **b. overhead**
  - **3. Fuel Systems**
    - **a. handout**
    - **b. overhead**
  - **4. Engine Fundamentals**
    - **a. slide presentation (Engine Components)**

III. Preventive Maintenance
- **A. Cooling System**
  - **1. Air Cooled**
    - **a. overhead**
    - **b. handout**
  - **2. Water Cooled**
    - **a. overhead**
    - **b. handout**
- **B. Intake (Handouts, Overheads)**
  - **1. Filters**
    - **a. fuel contamination and effects on emissions**
  - **2. Hoses**
  - **3. Flame Arrestors**
  - **4. Indicators**
- **C. Exhaust System After Treatment**
  - **1. Scrubbers**
    - **a. overheads**
  - **2. Converters**
    - **a. overheads**

D. Lubrication System
- **1. Effect on Emission**
  - **a. overhead**
- **2. Lube Oil System**
  - **a. three overheads**

E. Housekeeping
- **1. Discussion**

IV. Emission Testing

A. Instruments
- **1. Handout**

B. TLV Levels
- **1. Handout**

C. Record Keeping
- **1. Discussion**

D. New Technology
- **1. Handout**

V. State and Federal Laws and Regulations

A. Certification Requirements
- **1. Maintaining Certification**
  - **a. handout**
- **2. Virginia Rules & Regulations for Underground Diesel Equipment**
  - **a. discussion**
- **3. 30 CFR part 7, et al**
  - **a. discussion**
- **4. Part 36**
  - **a. discussion**
- **5. Part 75 Subpart T**
  - **a. discussion**
  - **b. handout**
- **6. Part 70 Subpart T**
  - **a. discussion**
  - **b. handout**

The contents of this book have been prepared for you to use during your Annual Underground Retraining.

PLEASE DO NOT WRITE IN THIS MANUAL

We hope that today will be interesting and helpful in making you more aware of the hazards that you encounter each day. We also hope that you will be more aware and knowledgeable of good safety practices and procedures of your job.

We would like to encourage you to take an active part in class by asking questions and making statements or comments related to topics being discussed.

EXPECTIONS

* No chewing, eating or drinking in classroom

* No alcoholic beverages or smoking in the building

* Do not ask instructor for permission to leave facility

* Return from breaks promptly

Let's all begin to learn and practice more about safety!!!!

DEPARTMENT OF MINES, MINERALS AND ENERGY
DIVISION OF MINES
CLASS REGISTER

INSTRUCTOR: _____ DAYS PER WEEK:_____

LOCATION: _____ HOURS OF EACH CLASS:_____

DATE (FIRST CLASS): _____ TOTAL REGISTERED: _____

NAME OF CLASS: ( ) MINE FOREMAN ( ) ELECTRICAL ( ) OTHER _____

NAME & ADDRESS	TELEPHONE	SS#	WHERE EMPLOYED

Continuing Education
Diesel Retraining Pre-Test

1. In what order does the four-stroke diesel engine cycle occur?
   A. _____
   B. _____
   C. _____
   D. _____

2. The large end of the connecting rod is attached to the _____ by the rod cap.
   A. camshaft
   B. piston
   C. crank shaft
   D. cylinder liner

3. How often must intake and exhaust system be visually examined?
   A. daily
   B. shiftily
   C. weekly
   D. monthly

4. Who must perform maintenance on diesel engines?
   A. gob boss
   B. mine foreman
   C. chief electrician
   D. certified diesel mechanic

5. _____ is the lowest temperature at which the fuel burns.
   A. methane
   B. antifreeze
   C. flash point

6. Which one of the diesel engines listed below is intended for use in areas of coal mine where non-permissible equipment is allowed?
   A. category A engines
   B. category B engines
   C. category C engines
   D. category D engines

7. How often should you mix gasoline with diesel fuel?
   A. as often as necessary
   B. daily
   C. in the winter
   D. NEVER

8. Carbon residue is the material left after _____?

A. intake
B. fuel
C. combustion

9. What three emission gases must be sampled daily?
   A. CO, CO^2, NO
   B. CO, NO^2, NO
   C. HCHO, CH^4, H^2O

10. When a piece of diesel equipment is receiving fuel, the engine must be _____.
    A. washed
    B. adjusted
    C. stopped
    D. lubricated

Pre-Test
Answer Sheet

1. intake, compression, power, exhaust
2. C
3. B
4. D
5. C
6. B
7. D
8. C
9. B
10. C

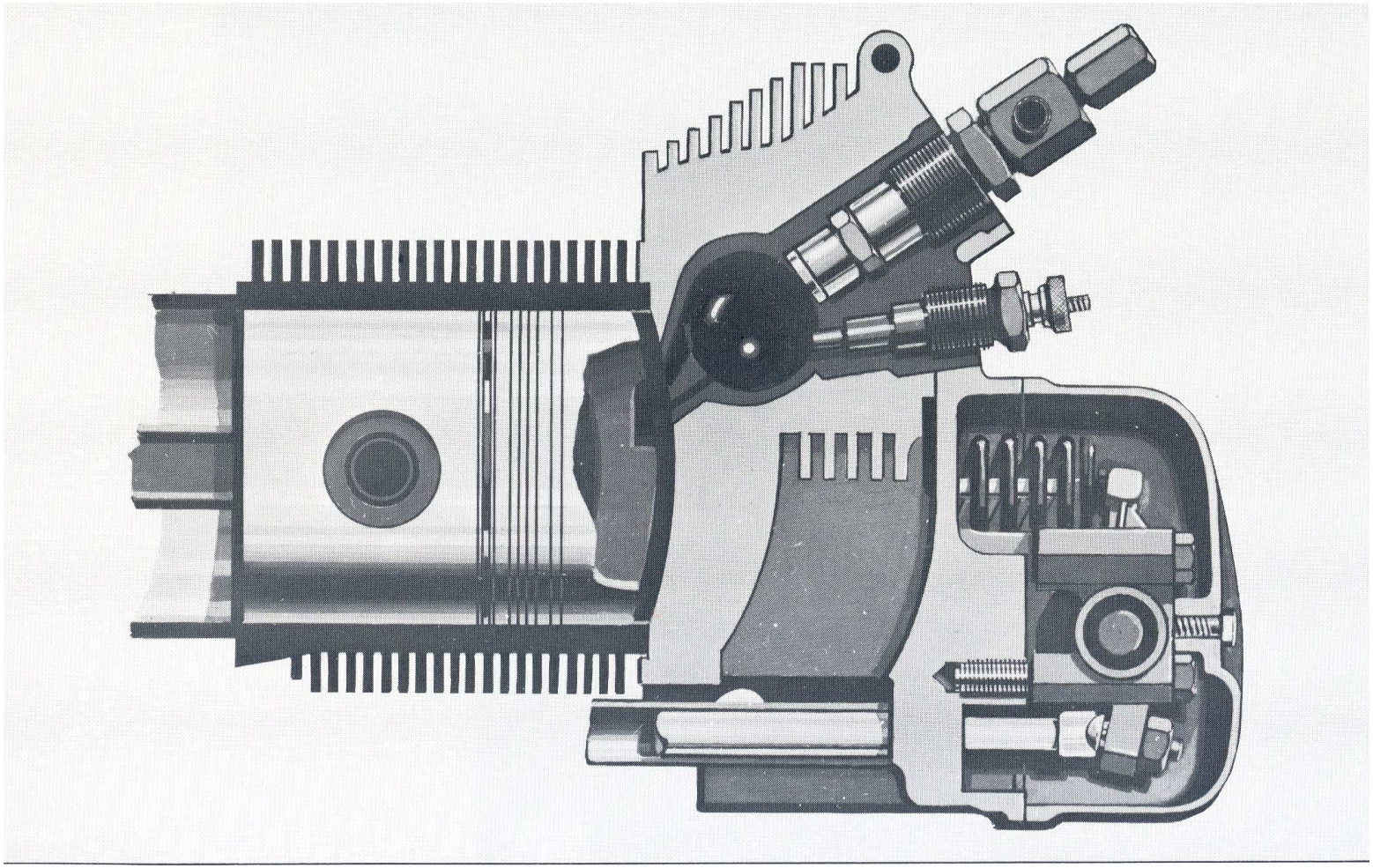
Review of Four Cycle Systems

OVERHEAD #1

Description: Air cooled cylinder

Topics to discuss:

A. Cooling fins
B. Push rods
C. Valve adjustments
D. Rocker arm
E. Valves
F. Retainers
G. Valve springs
H. Valve seals
I. Pre-combustion chamber
J. Cylinder
K. Design of piston
L. Piston rings
M. Wrist pin
N. Wrist pin keepers
O. Connecting rod
P. Injector
Q. Glow plug
R. Lubrication



OVERHEAD #2

Description: Direct injection combustion systems

Topics to discuss:

A. Piston design
B. Turbulence of air due to piston design
C. Type of injector
D. Viscosity
E. Damaged injector

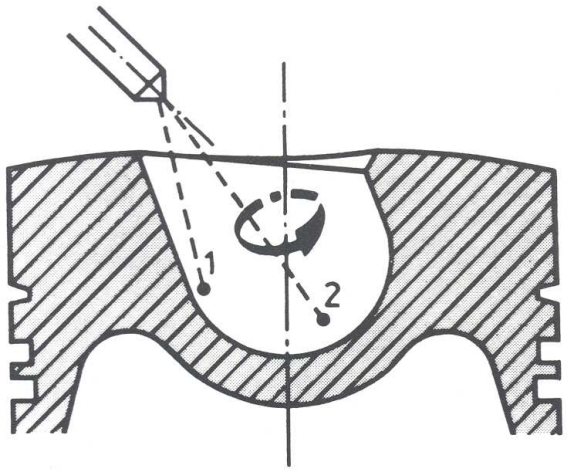


Fig. 3b: D-type combustion.

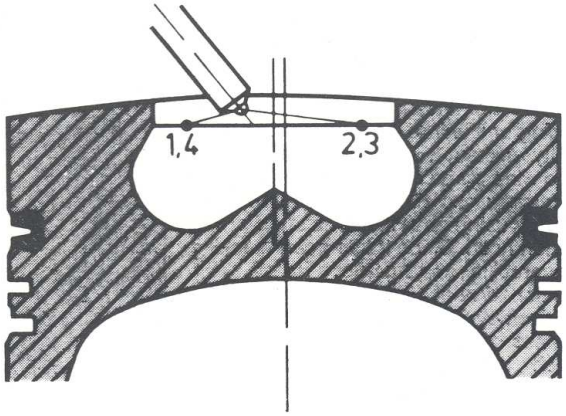
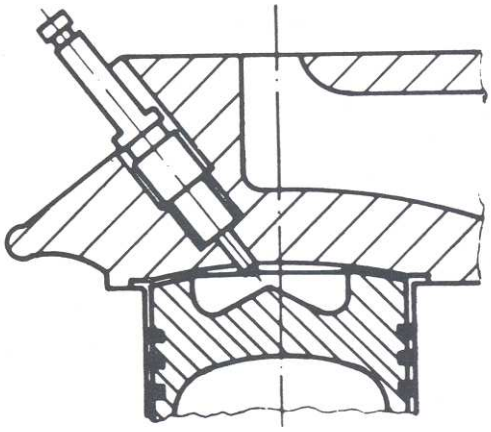


Fig. 3c: Z-type combustion.



Open piston bowl and 4-hole injector in the BFL 513 engine.

OVERHEAD #3

Description: The four stroke principle

Topics to discuss:

A. Order of strokes
B. Intake, compression, power, exhaust
C. Intake and exhaust valves
D. Quantity of air entering the cylinder
E. Pressure before and after combustion
F. Temperature of compressed air
G. Compression ratio
H. Stress
I. Turbulence within the combustion chamber
J. Injection of fuel
K. Mixing of fuel and air
L. Timing of combustion

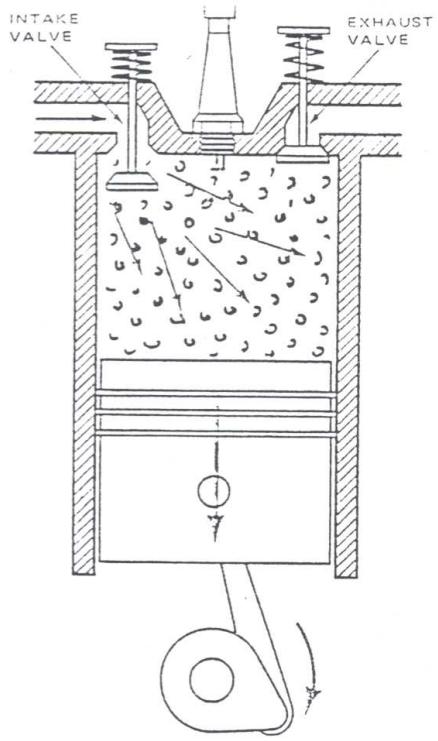


Fig. 2-8. On the intake stroke, the intake valve is open and the exhaust valve is closed.

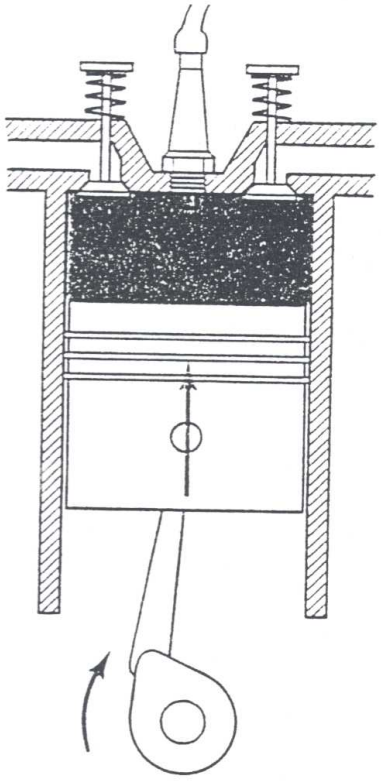


Fig. 2-9. On the compression stroke, both valves are closed.

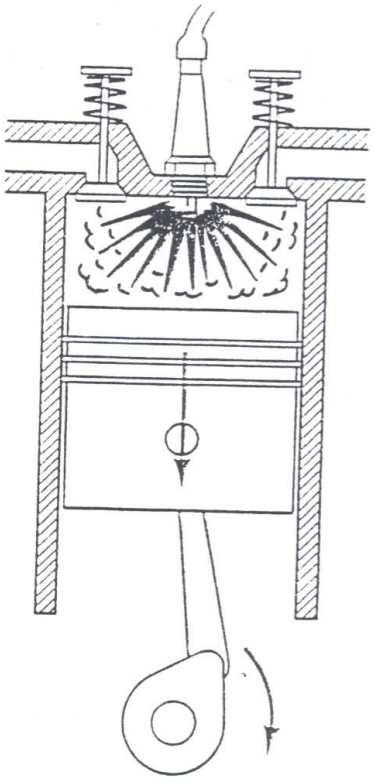


Fig. 2-10. Power stroke. Both valves are still closed.

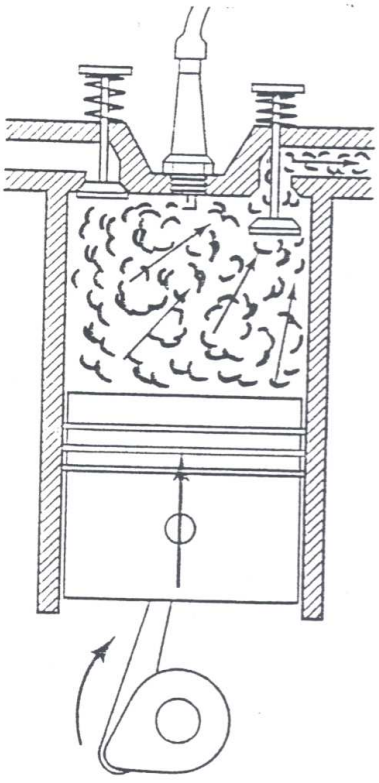


Fig. 2-11. Exhaust stroke. Exhaust valve is open; intake valve is closed.

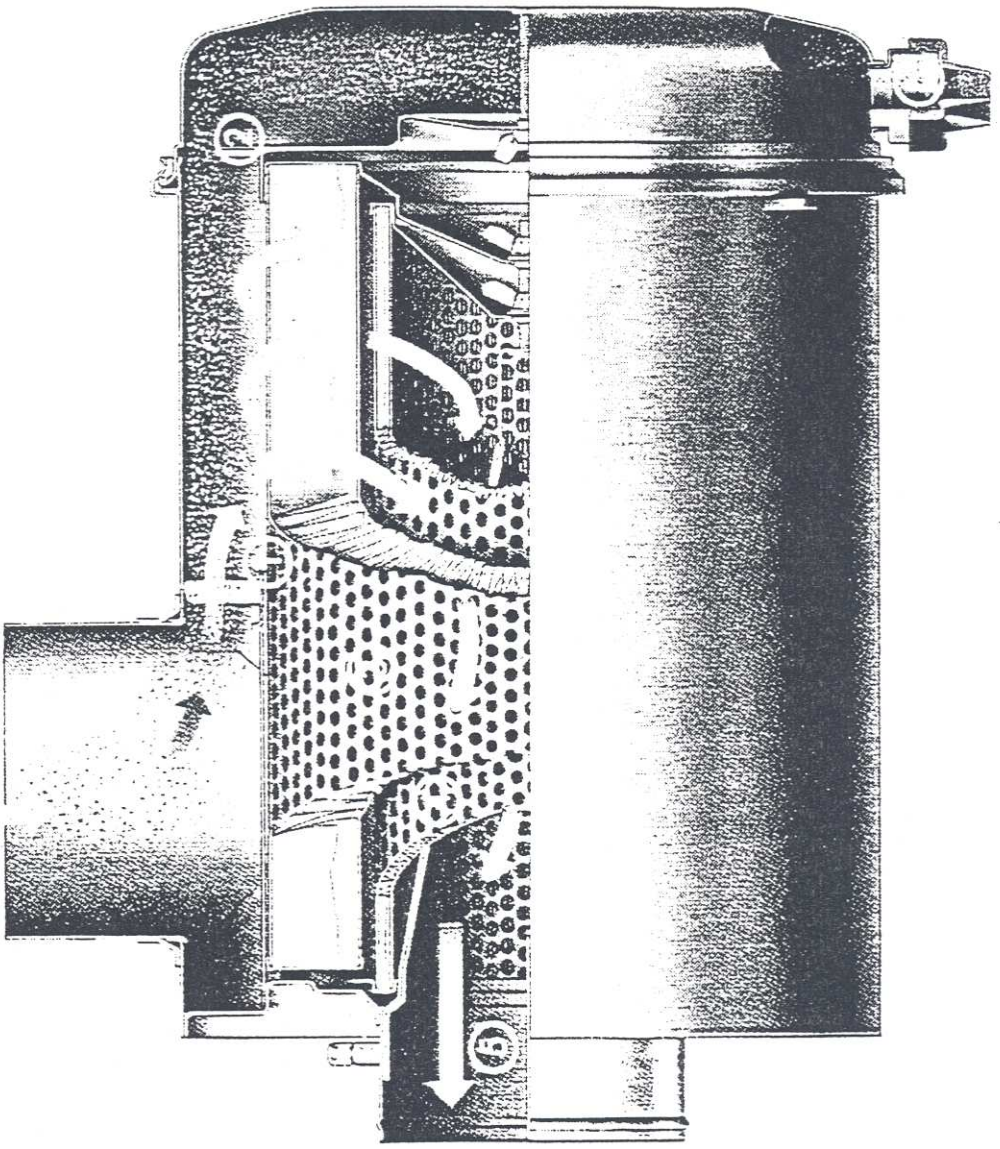
INTAKE SYSTEM

OVERHEAD #4

Description: Intake system

Topics to discuss:

A. Environment
B. Size of particles
C. Area of the filter
D. Large size particle discharge
E. Primary and secondary filter
F. Hose connections
G. Replacing
H. Pressure differential

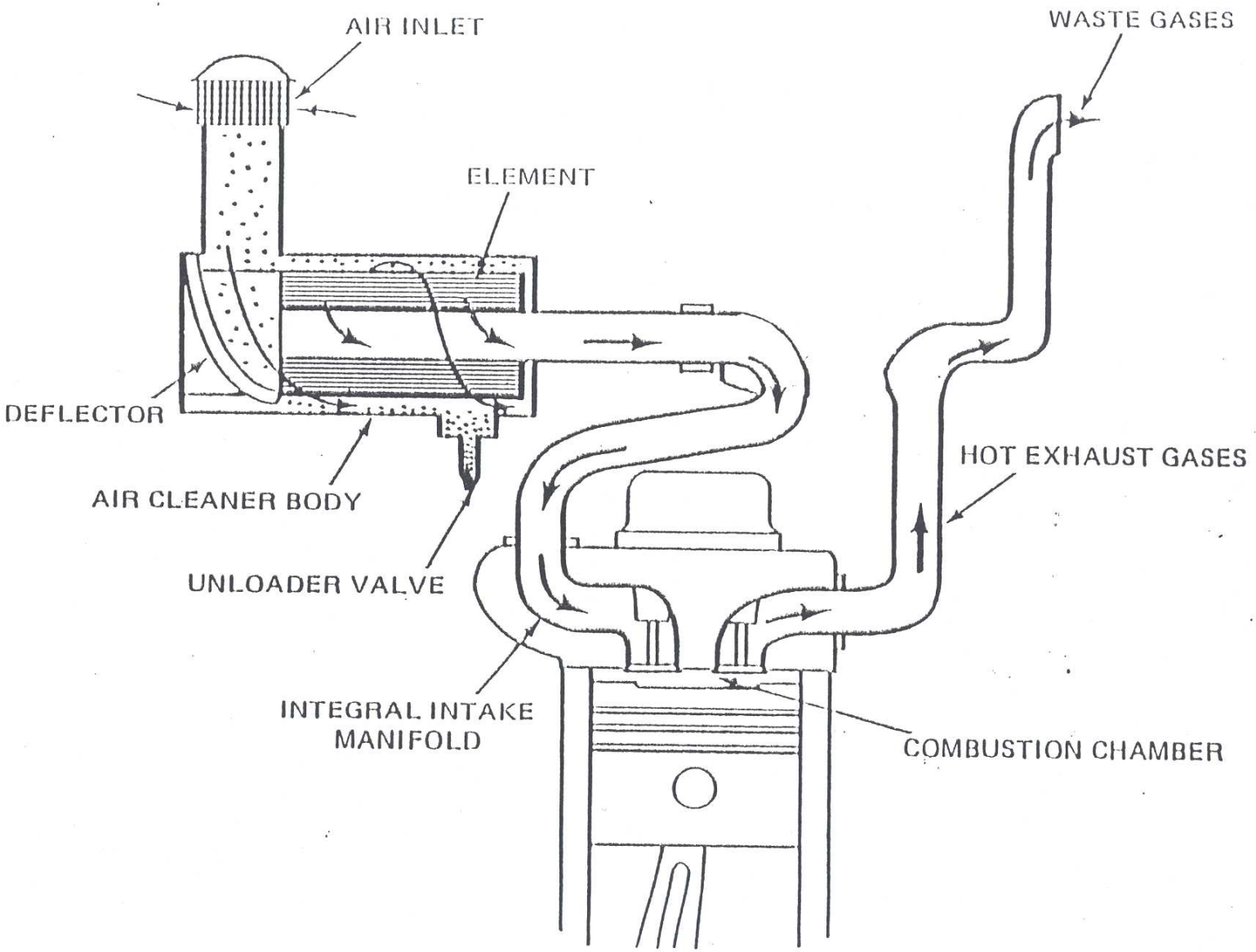


OVERHEAD #5

Description: Intake/Exhaust system

Topics to discuss:

A. Air filtration
B. Unloader valve
C. Filter element
D. Deflector
E. Intake manifold
F. Combustion chamber
G. Intake/exhaust valve
H. Exhaust manifold
I. Exhaust pipe


AIR INLET
WASTE GASES
ELEMENT
DEFLECTOR
AIR CLEANER BODY
HOT EXHAUST GASES
UNLOADER VALVE
INTEGRAL INTAKE MANIFOLD
COMBUSTION CHAMBER

FUEL SYSTEMS

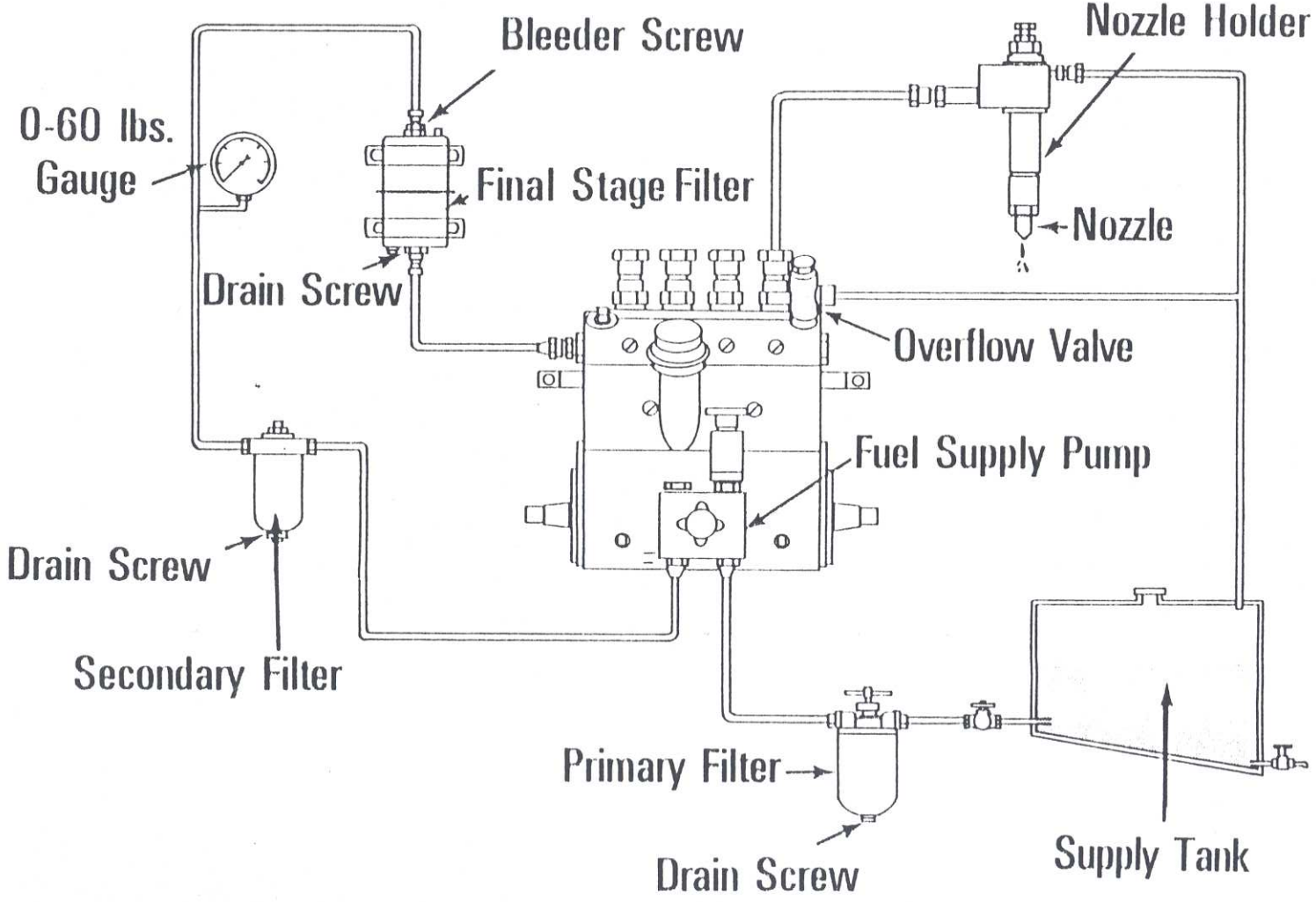
OVERHEAD #6

Description: Fuel flow

Topics to discuss:

A. Supply tank
B. Cut off valve
C. Primary filter
D. Injection pump
E. Fuel supply pump
F. Secondary filter
G. Fuel pressure “low”
H. Final filter
I. Fuel chamber
J. Overflow valve
K. Nozzle “injector”
L. Return line

Fuel Flow


Bleeder Screw
Nozzle Holder
0-60 lbs.
Gauge
Final Stage Filter
Nozzle
Drain Screw
Overflow Valve
Fuel Supply Pump
Drain Screw
Secondary Filter
Primary Filter
Drain Screw
Supply Tank

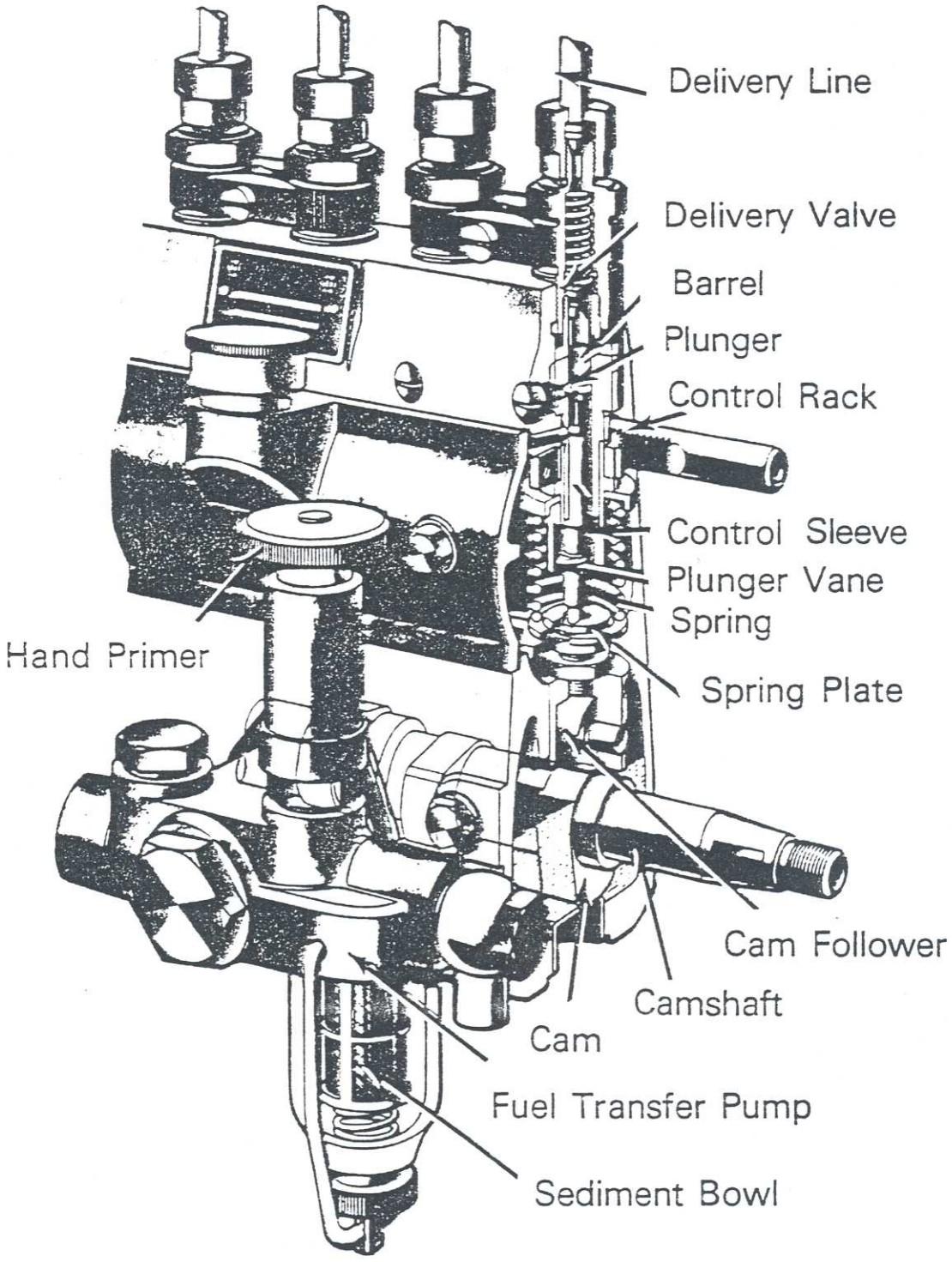
OVERHEAD #7

Description: Injection pump operation

Topics to discuss:

A. Fuel lift pump
B. Camshaft
C. Cam followers
D. Barrel & plunger assembly
E. Control rack
F. Delivery valve

Injection Pump Operation



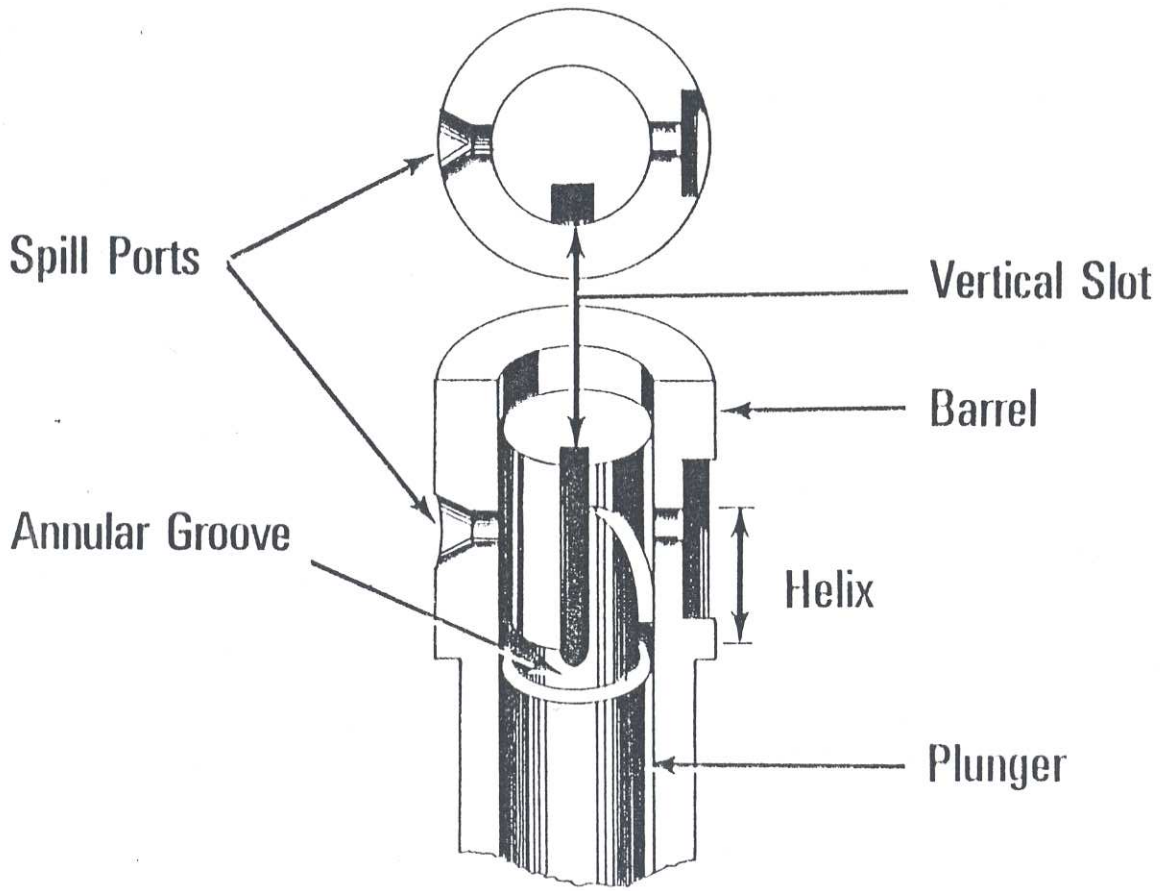
OVERHEAD #8

Description: Barrel & plunger assembly

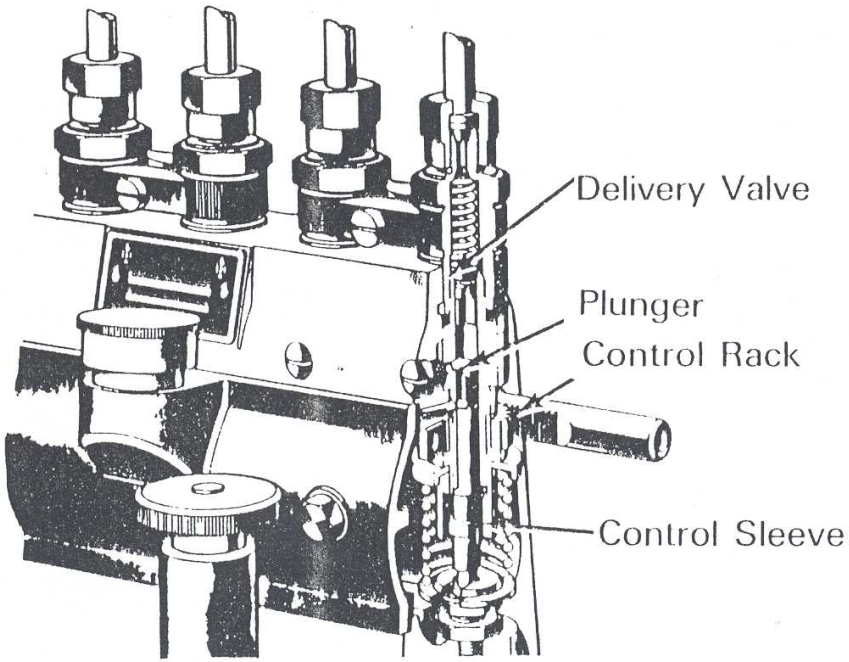
Topics to discuss:

A. Barrel
B. Spill parts
C. Plunger
D. Matched set
E. Stroke
F. Annular groove
G. Vertical slot
H. Helix
I. Different designs

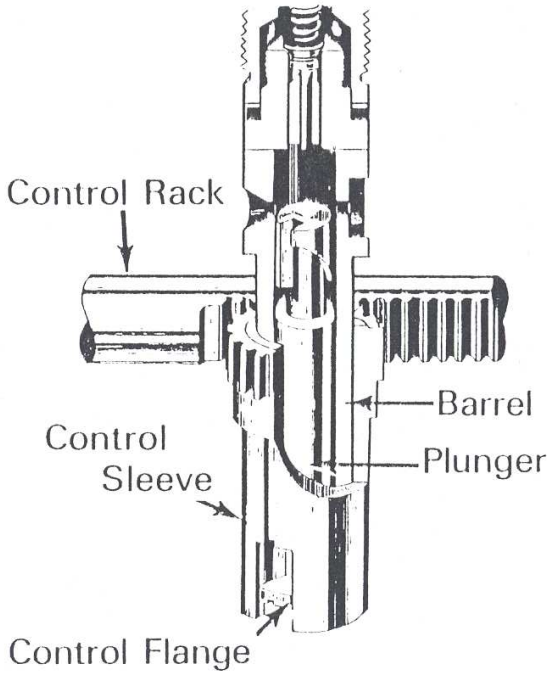
Parts And Design Of Pumping Element



Control Rack And Sleeve



Control Rack, Sleeve, and Delivery Valve



Plunger Rotation Mechanism.
(American Bosch AMBAC Industries, Inc.)

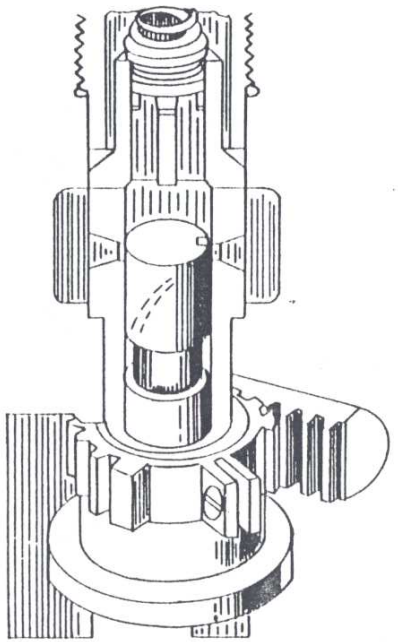
OVERHEAD #9

Description: Fuel delivery

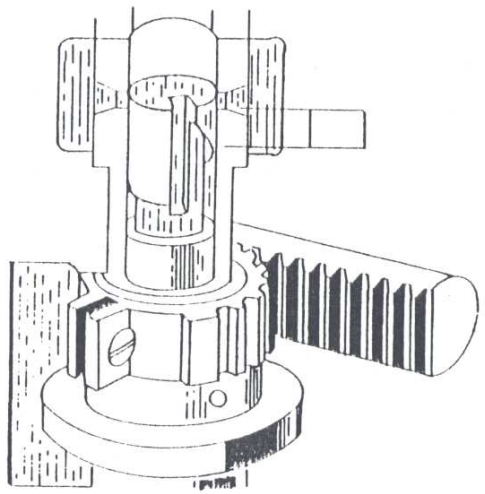
Topics to discuss:

A. Port closure
B. Length of stroke travel
C. Effective delivery
D. No fuel delivery
E. Maximum fuel delivery

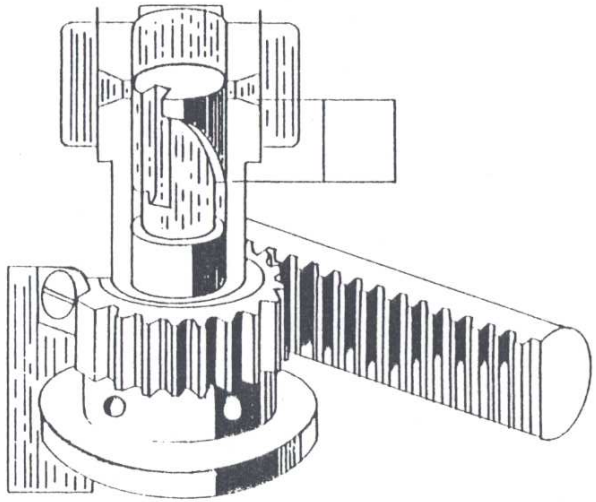
Plunger Positions At Fuel Delivery



No Fuel Delivery



Partial Fuel Delivery



Maximum Fuel Delivery

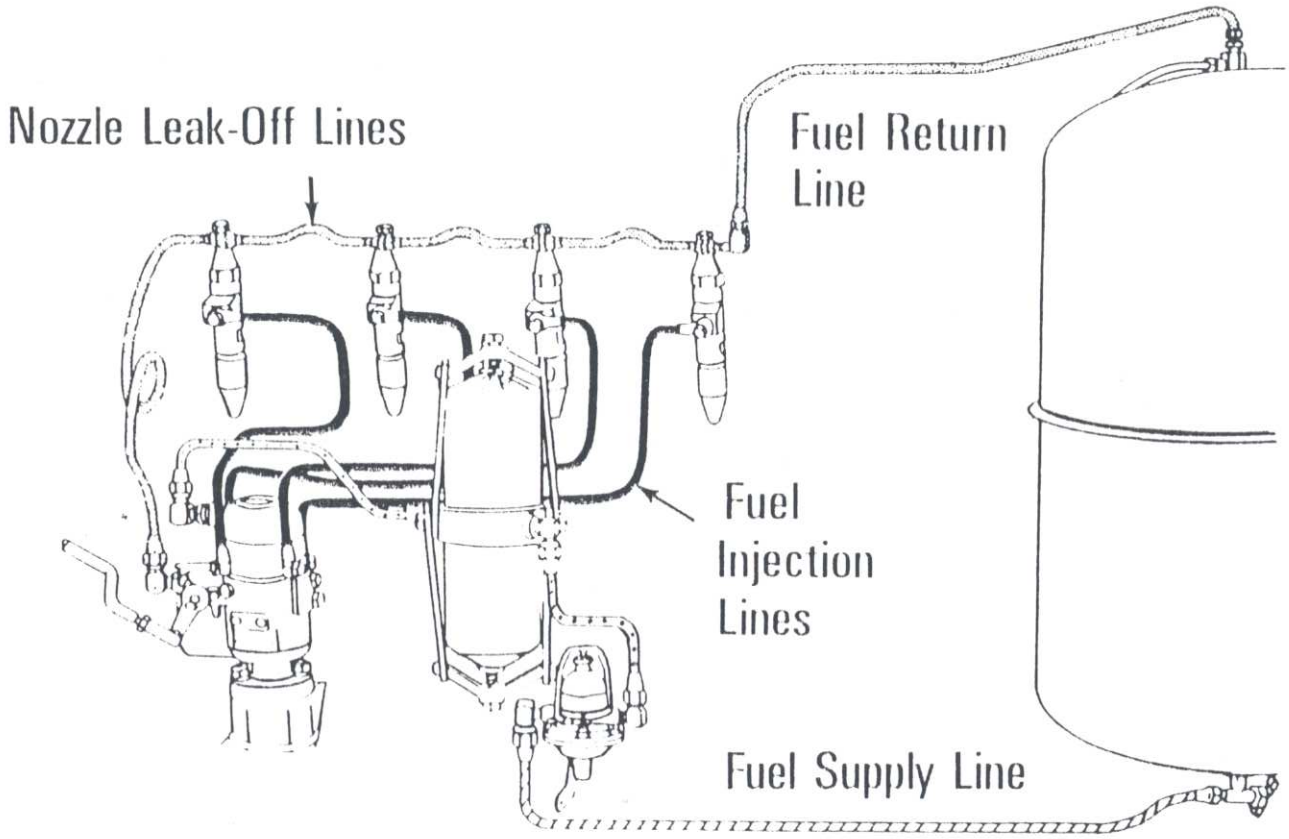
OVERHEAD #10

Description: Types of fuel lines

Topics to discuss:

A. Low pressure
B. High pressure
C. No pressure
D. Dangers included with high pressure
E. As much as 5000 p.s.i. on high pressure

Types of Fuel Lines



Very High Pressure

Low Pressure

No Pressure

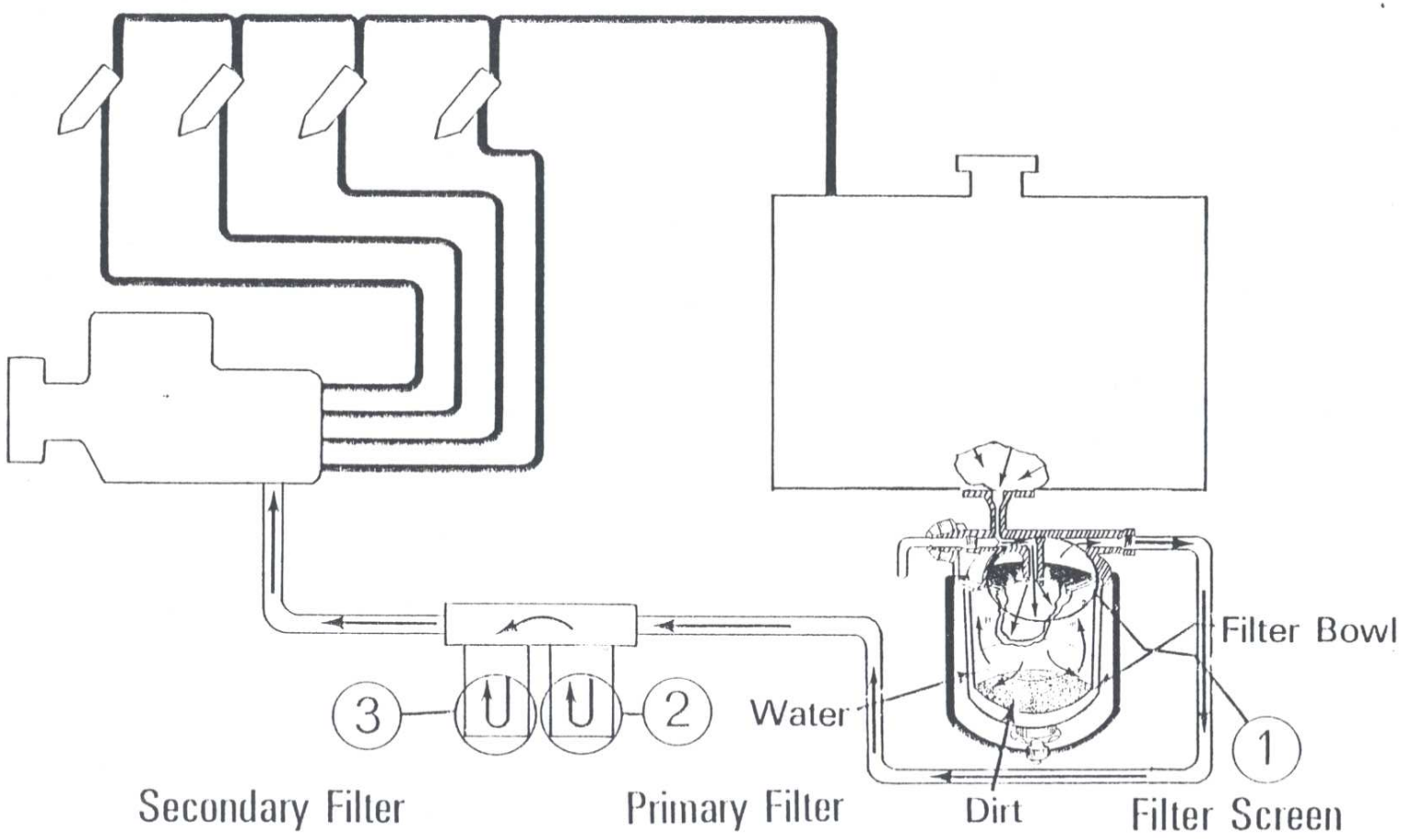
OVERHEAD #11

Description: Fuel filtration

Topics to discuss:

A. Microns
B. Sedimentation
C. Water contamination
D. Primary filter
E. Secondary filter

Stages of Fuel Filtration



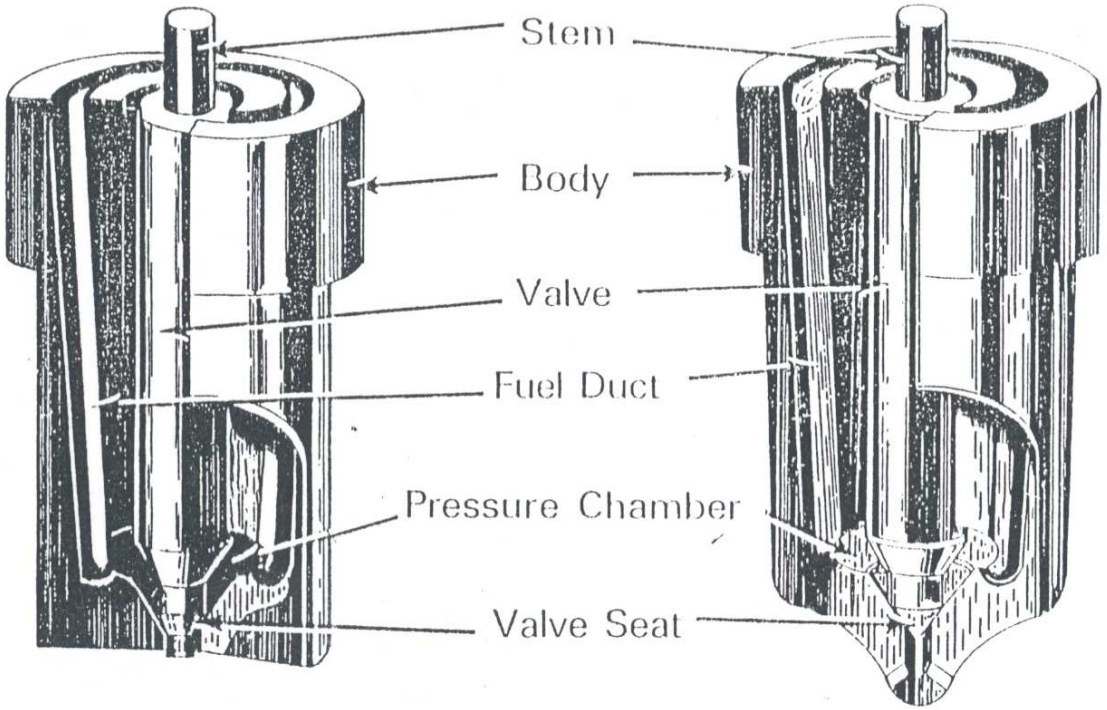
OVERHEAD #12

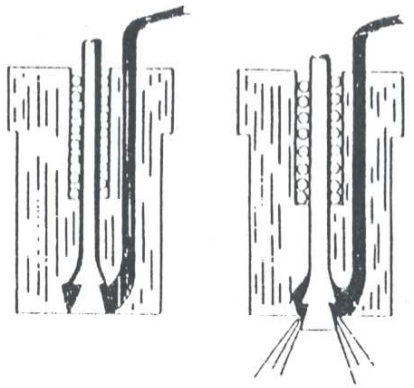
Description: Injection nozzles

Topics to discuss:

A. Body
B. Valve
C. Fuel duct
D. Pressure chamber
E. Valve seat
F. Inward opening
G. Outward opening
H. Pintle-type
I. Orifice-type
J. Sophisticated relief valve

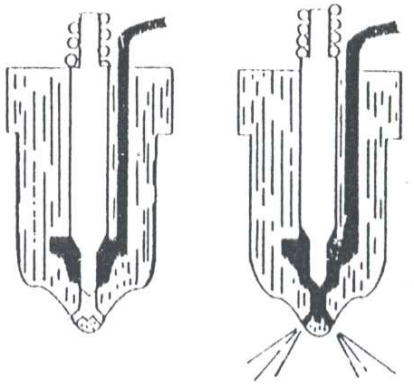
Nozzle Valve Assembly





Outward-Opening

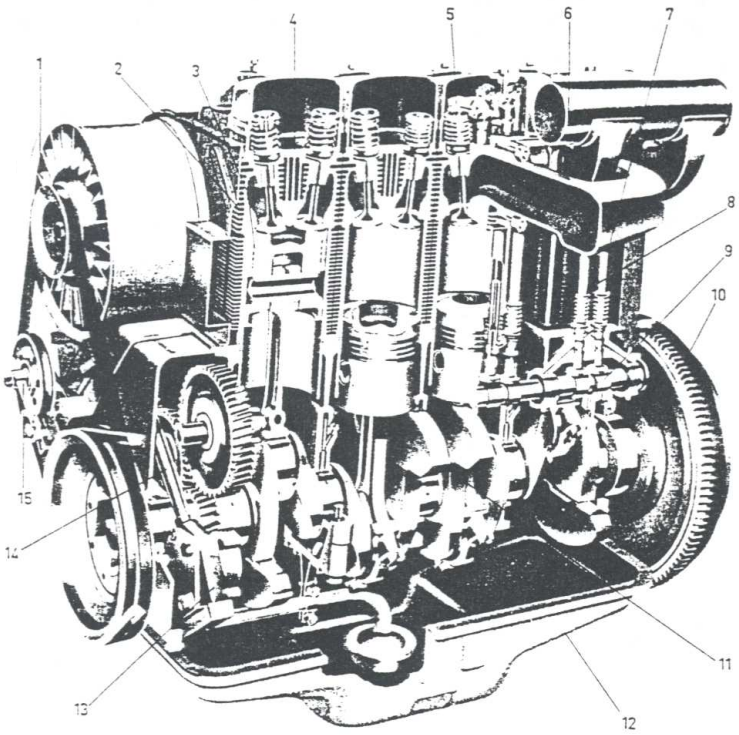
Pintle-Type



Inward-Opening

Hole-Type

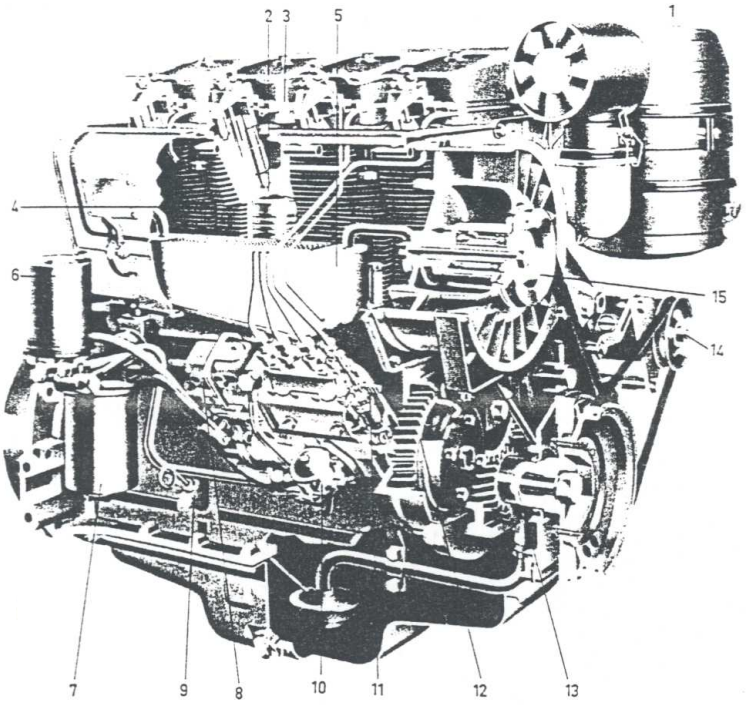
TM 2



Cutaway View of Direct Injection F4L 912 Four Cylinder Engine

Exhaust Side

1 cooling fan
2 cooling fins
3 piston and (direct injection type) combustion chamber
4 light metal cylinder head and inlet/outlet valve assy.
5 rocker arm
6 induction manifold
7 exhaust manifold
8 pushrod and duct assy.
9 camshaft
10 flywheel and ring gear assy.
11 crankshaft and counterweight assy.
12 sump
13 lube oil pump
14 timing gear train
15 cooling fan



Service Side

1 oil bath type air cleaner and preliminary filter assy.
2 injectors
3 cylinder head cover
4 finned cylinder barrel
5 block-type oil cooler
6 fuel filter
7 lube oil filter
8 governor and speed control lever assy.
9 dipstick
10 fuel lift pump
11 fuel injection pump
12 timing gear train
13 lube oil pump
14 dynamo/alternator
15 cooling fan

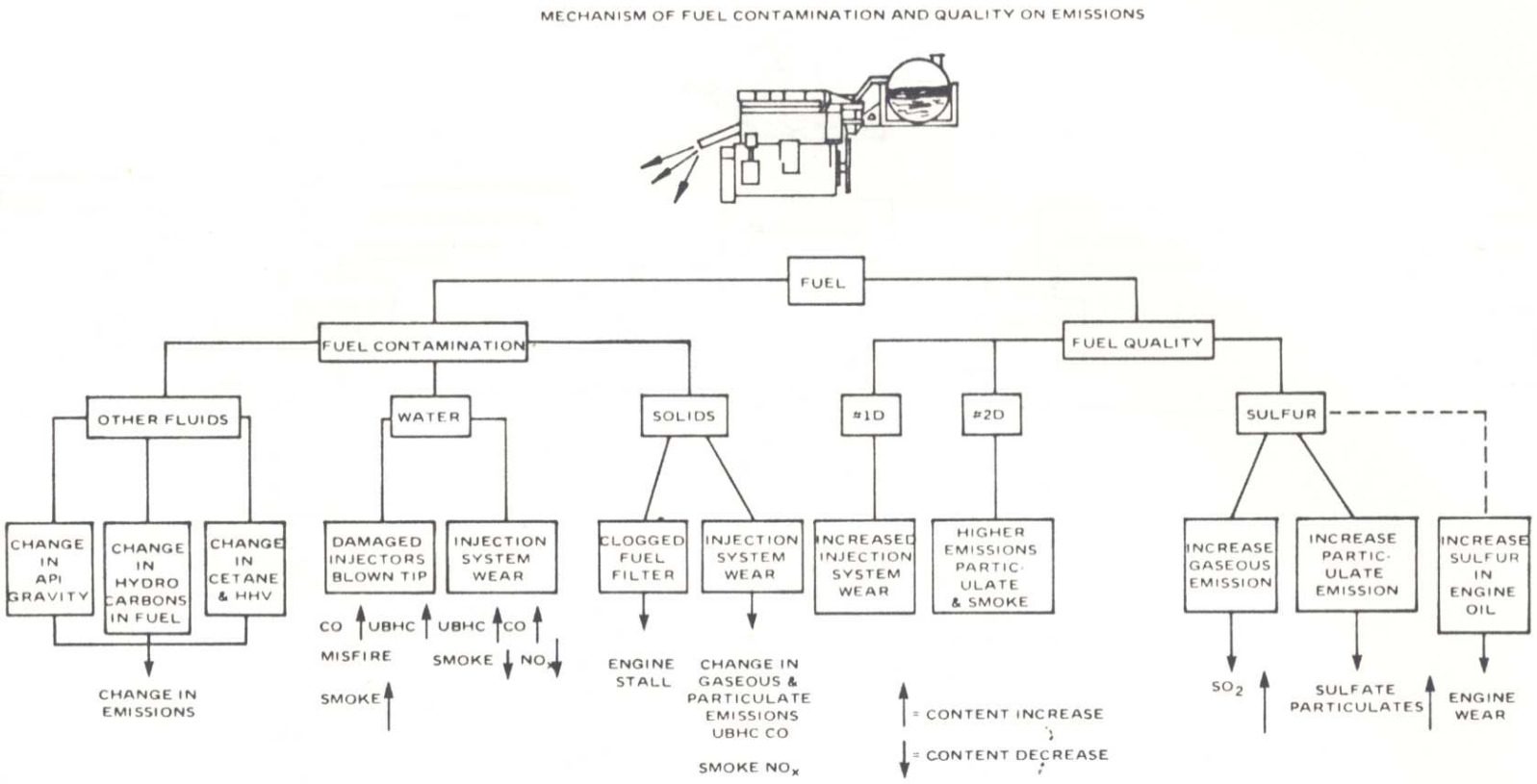
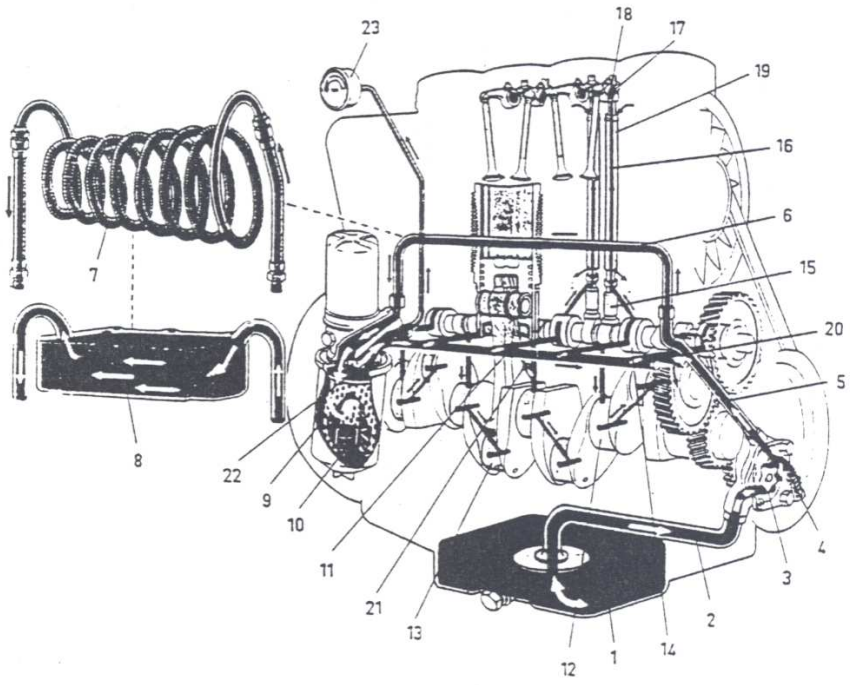


FIGURE C-28. RELATIONSHIP OF FUEL CONTAMINATION TO EMISSIONS

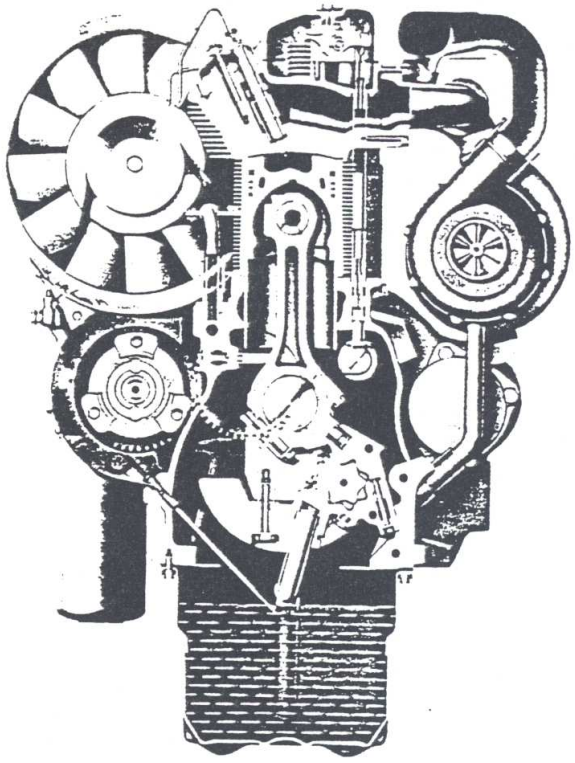
ENGINE FUNDAMENTALS



Lube Oil System

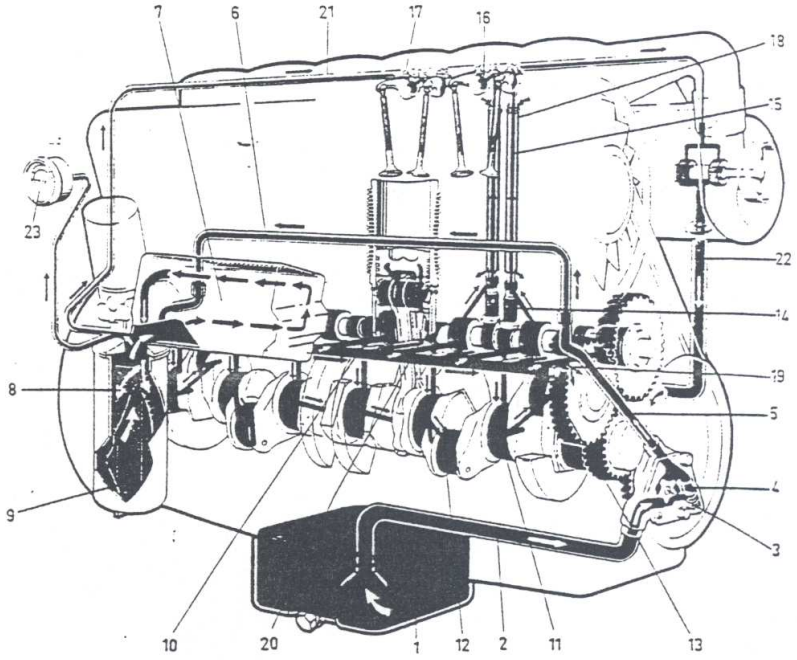
1 sump
2 suction pipe
3 lube oil pump
4 oil pressure control valve
5 pressure pipe
6 by-pass pipe or alternative
7 cooling coil or alternatively:
8 block-type oil cooler
9 oil filter
10 safety valve
11 main oil gallery
12 main bearing
13 big end bearing
14 camshaft bearing
15 tappet (with timing groove to pulse-lubricate rocker arm
16 pushrod (hollow, used as rocker arm oil feed pipe
17 rocker arm bearing
18 metering plug (to control valve lubrication)
19 pushrod duct (used as cylinder-head-to-crankcase oil return pipe
20 splash hole to lubricate timing gears
21 piston cooling nozzle
22 oil pressure gauge adaptor
23 oil pressure gauge

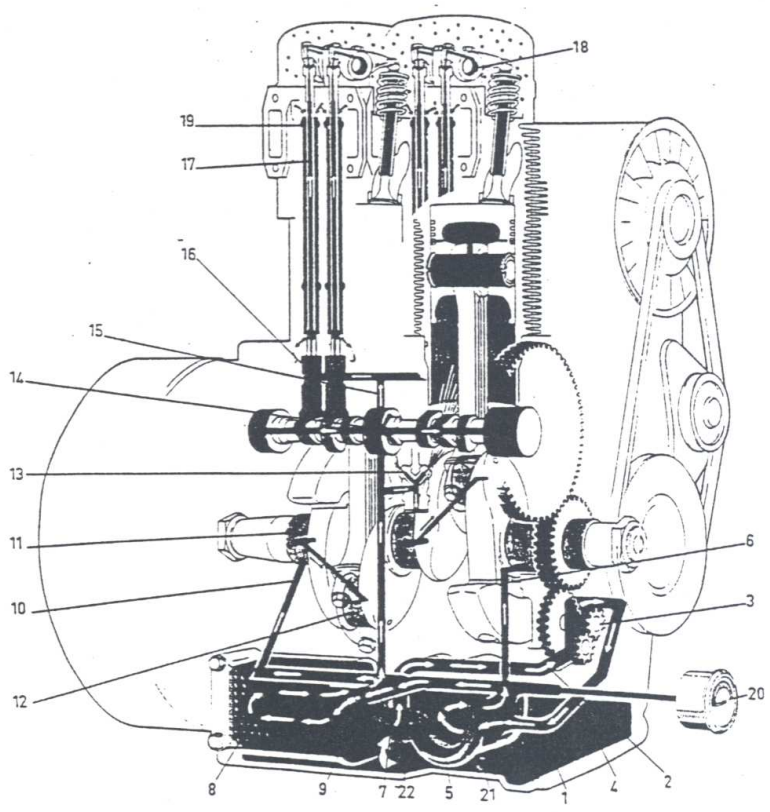
Sectional View of BF6L 913



BF6L 913 Lube Oil System

1 sump
2 suction pipe
3 oil pump
4 oil pressure control valve
5 pressure pipe
6 oil cooler connecting pipe (by-pass)
7 block-type oil cooler
8 oil filter
safety valve
10 main oil gallery
11 main bearing
12 big end bearing
13 camshaft bearing
14 tappet (with timing groove to pulse-lubricate rocker arms)
15 pushrod (hollow, used as rocker arm oil feed pipe)
16 rocker arm bearings
17 metering plug (to control valve lubrication)
18 pushrod duct (used as cylinder-head-to-crankcase oil return pipe)
19 splash hole (for timing gear lubrication)
20 piston cooling spray nozzle
21 lube oil feed pipe for exhaust turbocharger
22 exhaust turbocharger-to-crankcase oil return pipe
23 oil pressure gauge





F2L 912/W Lube Oil System

1 sump
2 suction pipe
3 lube oil pump
4 pressure pipe
5 oil filter and filter cartridge assy. (full-flow type)
6 no. 3 main bearing oil duct
7 oil cooler feed pipe
8 oil cooler (to suit engine version)
9 oil feed pipe for no. 2 main bearing, camshaft/timing gears and piston cooling device
10 oil duct for no. 1 main bearing
11 main bearing
12 big end bearing
13 piston cooling spray nozzle
14 camshaft bearing
15 tappet oil duct
16 tappet (with timing groove to pulse-lubricate rocker arm)
17 pushrod (hollow, used as rocker arm lube oil feed pipe)
18 rocker arm bearing
19 push rod duct (used as cylinder-head-to-crankcase oil return pipe)
20 oil pressure gauge
21 oil filter housing drain plug
22 main drain plug

DIESEL FUEL

Objectives

In this chapter you will learn:

- Five differences between diesel fuel and gasoline
- The effects of cold weather on diesel fuel
- How cold weather's effects on diesel fuel are compensated
- The difference between cetane and octane ratings
- How ignition lag time is influenced by the cetane rating
- Why diesel fuel and gasoline should never be mixed
- Why a wound contaminated with fuel should be treated immediately
- Five rules for storing diesel fuel

Diesel Fuel Characteristics

Diesel fuel, like gasoline, is made from petroleum. However, at the refinery, the petroleum is separated into three major components – gasoline, middle distillates, and all remaining substances.

Diesel fuel comes from the middle distillate group, which has properties and characteristics different from gasoline. Each of these characteristics will be discussed and contrasted with gasoline.

Heat Energy

Diesel fuel contains more heat energy than gasoline. The heat energy or value is commonly measured in *British thermal units* (BTU). One BTU is the amount of heat energy needed to raise the temperature of one pound of water one degree Fahrenheit. (The metric equivalent of the BTU is the calorie. One calorie will raise gram of water one degree Celsius). The diesel engine converts the fuel's heat energy into power. If the fuel used has a high heat energy content, more heat energy will be released. Hence, if two engines are identical, each having the same thermal efficiency, but are fed two different fuels, the engine that receives the fuel containing the higher BTU content would be more economical. It would produce the same power using less fuel.

Specific Gravity

The specific gravity of a liquid is a measurement of the liquid's weight compared to water. Water is assigned a value of 1. Diesel fuel is lighter than water but heavier than gasoline and can change if it is mixed with other fuels. The specific gravity of diesel fuel is important to engine operation. The fuel must be heavy enough to achieve adequate penetration into the combustion chamber. If the specific gravity is too low, all the fuel immediately burns upon entering the combustion chamber. This puts all the force of combustion on one small area of the piston instead of equal force across the dome. As a result, performance suffers, engine noise increases and the piston could eventually be damaged.

Wax Appearance Point and Pour Point

Temperature affects diesel fuel more than it affects gasoline. This is because diesel fuels contain paraffin, a wax substance common among middle distillate fuels. As temperatures drop past a certain point, wax crystals begin to form in the fuel. The point where the wax crystals appear is the *wax appearance point* (WAP) or *cloud point*. WAP may change as a result of the origin of the crude oil and the quality of the fuel. The better the quality, the lower the WAP. As temperatures drop, the wax crystals grow larger and restrict the flow of fuel through the filters and lines. Eventually, the fuel, which may still be a liquid, stops flowing because the wax crystals plug a filter or line. As the temperature continues to drop, the fuel reaches a point where it solidifies and no longer flows. This is called the pour point. In cold climates, it is recommended that a low-temperature pour point fuel be used.

Viscosity

The viscosity of diesel fuel directly affects the spray pattern of the fuel into the combustion chamber and the fuel system components. Fuel with a high viscosity produces large droplets that are hard to burn. Fuel with a low viscosity sprays in a fine, easily burned mist. If the viscosity is too low, it does not adequately lubricate and cool the injection pump and nozzles.

Volatility

Volatility is the ability of a liquid to change into a vapor. Gasoline is extremely volatile compared to diesel fuel. Fore instance, if diesel fuel and gasoline are exposed to the atmosphere at room temperature, the gasoline evaporated and the diesel fuel does not.

Flash Point

Flash point is the lowest temperature at which the fuel burns when ignited by an external source. The flash point has little bearing on engine performance, but it is important in fuel storage safety. (The temperature at which the flash point occurs is regulated). If the flash point of diesel fuel were lower than specified, it would have the right combination of air and fumes that would ignite too easily, making the handling of it hazardous. Gasoline evaporates at a very low temperature, filling the tank with fumes that are potentially explosive.

Cetane Rating

The ignition quality of a fuel refers to how well it self-ignites under heat and pressure. Diesel fuel's ignition quality is measured by the cetane rating. To get a cetane number rating, a fuel is compared to cetane, a colorless, liquid hydrocarbon that has excellent ignition qualities. Cetane is rates at 100. The higher the cetane number, the shorter the ignition lag time (delay time) from the point the fuel enters the combustion chamber until it ignites. The exact rating is determined by mixing the cetane with a chemical called methyl-napthalene which is rated at zero since it does not ignite. The percentage of cetane mixed with methyl-nepthalene that produces a similar

Ignition quality to the fuel being tested is the cetane number rating. Ignition quality and flash pint should not be confused.

Flash point is the lowest temperature at which the fuel burns when ignited by an external source.

The quality of gasoline is measured by octane, which indicates the resistance of a fuel to self-ignite (knock). Premium gasoline has poor ignition quality, since it burns slower than regular gasoline and has more resistance to preignition and detonation., The higher an octane number, the opposite of gasoline octane ratings. For automotive diesels, the recommended cetane rating is approximately 45.

Carbon Residue

Carbon residue is the material left in the combustion chamber after burning. It is found not only in diesel engines, but also in other engines, but also in other engines that burn hydrocarbon fuel.

Sulfur Content

Sulfur content is common in fuels made from low-quality crude oil. Refining the oil removes only a portion of the sulfur. Sulfur increases ring and cylinder wear, causing the formation of varnish on the piston skirts and sludge in the oil pan. Changing the oil frequently or switching fuels often helps prevent wear.

Fuels that have a high sulfur content are often high in various nitrogen compounds. These nitrogen compounds, like the sulfur, form corrosive chemicals causing excessive engine wear.

Water Content

Water in diesel fuel is a major problem because water and diesel fuel readily mix. Careless storage and distribution of diesel fuel invites problems. Diesel fuel that appears cloudy often contains water. Some of the problems that water causes are:

1. Corrosion of the fuel system. This can cause the fuel filter to plug with rust particles.
2. Icing of the fuel system. Whatever the water collects and the temperature is low enough, ice forms, causing severe damage to the fuel system components.
3. Inadequate lubrication of the injection pump and nozzles. Water does not have good lubricating qualities.
4. Bacteria growth in diesel fuel.

Bacteria Content

Diesel fuel is attacked by various fungi and bacteria. They ingest the diesel fuel as food, changing it to their waste products – a slimy, gelatin-type growth. This growth not only plugs the fuel system but also produces an acid that is corrosive to fuel system components. Because the fuel may contain

harmful organisms, any that would be exposed to diesel fuel should be cleaned immediately. Fungicides and bactericides, which prevent their formation and growth, are available.

Commercial Fuel Ratings

There are three grades of diesel fuel for automotive use: 1-D, 2-D and 4-D. At one time, there was a grade 3-D, but it has been discontinued.

Grade 1-D is a kerosene-type fuel that has a lower viscosity, lower wax content, and lower BTU per gallon than grade 2-D. It is also more volatile than 2-D.

Grade 2-D is the fuel recommended for automotive and some industrial applications.

Grade 4-D is a fuel for low and medium speed engines.

Heating fuel, which is similar to grade 2-D fuel should not be used in automotive applications. Heating fuel does not meet the strict standards or have the needed additives for automotive use.

Blended Fuel

In cold climates, it is often necessary to run on a blended fuel. A blended fuel reduces the WAP and pour point, allowing the fuel to flow at low temperatures. Typically, grade 1-D fuel is used to lower the WAP and pour points of grade 2-D fuel. Each manufacturer has specific instructions on what blend should be used at certain temperatures. Usually, a 10% increase of grade 1-D to grade 2-D lowers the WAP by 2°F (1°C). However, since grade 1-D has a lower heat energy content, fuel economy also decreases.

Additives are chemicals added at the refinery to lower the WAP and pour point. At the refinery, the composition of the oil and wax content is known. The proper additives are blended with the fuel to give it the desired properties. Additives used in the after market by owners and technicians may or may not work because of variations in oil composition. Furthermore, use of additives may violate the manufacturer's warranty.

Fuel Storage

Clean fuel for operating diesel engines is essential. Adequate containers are necessary to store fuel until it is used. Technicians who keep a small supply of diesel fuel on hand should be aware of a few facts:

1. Diesel fuel ages and will go stale. Keep a fresh supply available.
2. Variations in heat and humidity tend to create condensation in the fuel storage containers. Fuel containers should be kept where the temperature is relatively moderate and out of direct sunlight.
3. Never store diesel fuel in galvanized containers. Diesel fuel caused the galvanizing to flake off, contaminating the fuel system and clogging the fuel filters.
4. Containers should always be properly labeled and identified as containing diesel fuel.
5. Never add alcohol to diesel fuel. This lowers the flash point of the fuel.

Summary

Diesel fuel has several characteristics different from gasoline. Diesel fuel has a higher heat content, specific gravity, and viscosity. Diesel fuel is more sensitive to cold weather. WAP (cloud point) is the temperature at which wax crystals appear. Pour point is the temperature at which diesel fuel solidifies and no longer flows. The cetane rating is the opposite of the octane rating. The higher the cetane number, the shorter the ignition delay times. Carbon residue is the material left after combustion. Small, high-speed diesels cannot tolerate excessive carbon deposits. Sulfur and nitrogen compounds create corrosive chemicals causing premature engine wear. Diesel fuel has an affinity for water. Care must be taken to keep the water content to a minimum.

Diesel fuels for automotive use comes in three grades: 1-D, 2-D, and 4-D. Grade 2-D is the recommended fuel for diesel engines in cars and trucks under most conditions. It is often blended with grade 1-D to lower the WAP and pour point.

Gasoline should never be mixed with diesel fuels. The combination of the fuels can create a powerful bomb with ignited by a spark.

Diesel fuel must be stored properly to prevent stale fuel and water contamination. It should never be stored in a galvanized container and never mixed with alcohol. Fuel containers should be clearly marked and identified.

Fuels and Emissions

1. How does diesel fuel obtain a cetane number?
   A. Diesel fuel is compared to octane
   B. Diesel fuel is compared to cetane

2. Diesel fuel is separated into _____ components.
   A. 2
   B. 3

3. _____ is one of the most important systems on a diesel engine.
   A. Injection system
   B. Pressure system

4. Material left in the combustion chamber after burning is called:
   A. Flash point
   B. Carbon residue

5. The higher the cetane number, the shorter the ignition:
   A. Delay time
   B. Back pressure

6. There are _____ grades of diesel fuel.
   A. 4
   B. 3

7. The rate diesel fuel burns is measured in:
   A. Volatility
   B. Cetane

8. The ignition quality and manner in which diesel fuel burns is related to its:
   A. Volatility
   B. Cetane

9. The fuel for diesel engines of machines approved for service in underground mines shall:
   A. have no requirements on the sulfur content
   B. Contain sulfur in a concentration of 0.25 percent or less by weight unless a variance is granted by the Chief.

10. Diesel fuel must be stored properly to prevent:
    A. Heat content
    B. Water contamination

11. What grade of fuel do manufacturers recommend for diesel engines?
    A. 4D
    B. 2D

12. Which of the following diesel fuels has the highest cetane number?
    A. 1D
    B. 2 D

13. Diesel fuel is obtained from?
    A. Coke
    B. Crude oil

14. The lowest temperature at which a fuel will ignite by an external source is defined as?
    A. Viscosity
    B. Cetane

15. Approximately what temperature is the air compressed before ignition occurs?
    A. 7000 degrees
    B. 1000 degrees

16. Heat energy or value is usually measured in:
    A. Specific gravity
    B. British Thermal Unit (BTU)

17. What is formed when diesel fuel is burned with a limited amount of air?
    A. Carbon monoxide
    B. Sulfur

18. What is formed when diesel fuel is burned with excess air?
    A. Carbon dioxide
    B. Sulfur dioxide

19. Sulfur content in diesel fuels can cause:
    A. Wear on ring and cylinder
    B. Wear on exhaust system

20. High sulfur content is common in fuels that are:
    A. Made of high quality crude oil
    B. Made of low quality crude oil

21. What is the rating of cetane?
    A. 50
    B. 100

22. Diesel fuel ignition quality is rated by:
    A. Cetane
    B. Octane

23. How well a fuel will self-ignite under heat and pressure is called:
    A. Ignition quality
    B. Flash point

24. Flash point is the lowest temperature at which a fuel burns when ignited by an:
    A. Internal source
    B. External source

25. When enough oxygen is present to burn the fuel in the combustion chamber, hydrocarbons will be deposited as:
    A. White smoke
    B. Soot

26. What will happen to the sulfur in diesel fuel after combustion?
    A. It will pass through as SO2 emissions
    B. It will remain in the combustion chamber

27. The characteristics of diesel fuel that is thin when hot and thick when cold is defined as:
    A. Volatility
    B. Viscosity

28. What does viscosity mean?
    A. Resistance to flow
    B. Greatest protection

29. The viscosity of diesel fuel directly affects the _____ of the fuel into the combustion chamber.
    A. Engine knock
    B. Spray pattern

30. When fuel changes from a liquid to a vapor, it is called:
    A. Flash point
    B. Volatility

31. _____ has the lowest volatility.
    A. Gasoline
    B. Diesel fuel

32. A catalytic converter can remove up to _____ % of diesel exhaust hydrocarbons
    A. 80%
    B. 20%

33. The catalytic converter changes SO2 to:
    A. SO4
    B. NO2

34. What does the catalytic converter do to the engine exhaust emission?
    A. Helps the engine perform
    B. Changes the emissions

35. The exhaust system on diesel powered equipment shall be inspected:
    A. Once per shift

B. Weekly

36. How many types of water bath scrubbers are used on diesel equipment?
    A. 4
    B. 2

37. State of the art water scrubbers on diesel powered equipment may capture up to _____% of exhaust hydrocarbons.
    A. 10%
    B. 20%

38. The main function of a water scrubber is:
    A. Lower exhaust temperature
    B. Make smoke clean

39. A water scrubber must be equipped with:
    A. High water shutdown
    B. Low water shutdown

40. How often should water scrubbers on underground diesel equipment be cleaned?
    A. Each day
    B. Each week

41. The two primary functions of a water scrubber are:
    A. Converter and catalyst
    B. Spark or flame arrester and exhaust-gas cooling

42. Water scrubbers should be constructed of _____ of long life.
    A. Copper
    B. Stainless steel

43. Water scrubbers are designed to:
    A. Keep the exhaust in water as long as possible to lower the temperature
    B. Raise the exhaust emissions

44. How does diesel fuel react in cold weather?
    A. Diesel fuel will get thicker as the temperature drops
    B. Diesel fuel will bet thinner as the temperature drops

45. Should gasoline be mixed with diesel fuel?
    A. A 50/50 mixture is usually acceptable
    B. No, never use gasoline in a diesel engine

Fuels & Emissions

1. B
2. B
3. A
4. B
5. A
6. B
7. B
8. A
9. B
10. B
11. B
12. A
13. B
14. C
15. B
16. B
17. A
18. A
19. A
20. B
21. B
22. A
23. A
24. B
25. B
26. A
27. B
28. A
29. B
30. B
31. B
32. A
33. A
34. B
35. A
36. B
37. B
38. A
39. B
40. A
41. B
42. B
43. A
44. A
45. B

DIESEL ENGINE
PREVENTIVE MAINTENANCE CHECKLIST

MINE: _____

DATE: _____

PERSON PERFORMING CHECKS: _____

Description of Task	Date Completed
1. Drain air tank water	_____
2. Check lights and horn	_____
3. Check fire extinguisher	_____
4. Change engine oil and filter	_____
5. Check fuel level	_____
6. Check brake shoes	_____
7. Check air filter indicator	_____
8. Check air intake piping	_____
9. Grease drive line u-joints	_____
10. Check all hoses/gaskets for leaks	_____
11. Check fuel filler cap	_____
12. Check exhaust piping/manifold	_____
13. Check fan drive oil and filter	_____
14. Check air filter	_____
15. Check trans, oil and filter	_____
16. Check final drive fluid level	_____
17. Check/drain fuel/water separator	_____
18. Check final drive oil hub seals	_____
19. Check battery electrolyte level	_____
20. Clean external engine components	_____
21. Clean transmission cooler	_____
22. Check/tighten belts	_____
23. Check fuel tank	_____
24. Clean filter bowl in engine blower	_____
25. Check engine components and machine for safe operating condition	_____

PREVENTIVE MAINTENANCE

1. The most common additive to be mixed with water in the cooling system is:
   A. Carbon tetrachloride
   B. Ethylene glycol

2. Why should antifreeze be used in summertime?
   A. To inhibit rust
   B. Coolant is able to pump water with greater ease

3. When water coolant system overheats, you should check:
   A. Fan belt & cooling system level
   B. Alternator & fuel pump

4. The coolant system should be checked on diesel powered equipment:
   A. Monthly
   B. Daily

5. The main purpose of the radiator cap is:
   A. Raise the boiling point of the coolant
   B. Help keep coolant in the reservoir

6. _____ circulates the water through a water cool engine:
   A. Radiator
   B. Coolant pump

7. _____ turns the fan on non-permissible diesel engine:
   A. Coolant pump
   B. Crankshaft

8. What is heat exchanger called on a diesel water cool engine?
   A. Radiator
   B. Impeller

9. What are water jackets on a diesel engine?
   A. Water pump
   B. Block of engine

10. The purpose of the coolant system on the diesel engine is:
    A. Cool the engine
    B. Cool the transmission

11. Maintenance on the engine exhaust system will be done:
    A. By a certified person
    B. By the operator

12. If the exhaust system is off a diesel engine, it must be:
    A. Fixed on the next shift
    B. Fixed immediately

13. To ensure that the fuel supplied to the injector pump is clean, fuel filters must be replaced:
    A. Monthly
    B. At regular intervals

14. Regular oil & filter changes are very important to reduce engine wear on cylinder, piston, and _____
    A. Flywheel
    B. Bearing

15. Fuel filters are rated in:
    A. Microns
    B. Particles

16. In case of fire, all underground diesel equipment must be equipped with _____.
    A. 250 lb. of rock dust
    B. Fire suppression system

17. Stationary diesel powered equipment must be equipped with _____ dry chemical or carbon dioxide system or no less effective system approved by the Virginia Division of Mines.
    A. A remote activated
    B. An automatically activated

18. Nozzles and reservoirs of the fire protection system shall be placed in accordance with:
    A. MSHA
    B. Manufacturer's specifications

19. The floor in the shop where diesel engines are to be repaired should be
    A. Free of grease and fuel
    B. No requirements

20. Oily rags that have been used on diesel equipment shall be:
    A. Kept in a box until removed
    B. Kept in closed metal containers until removed for disposal

21. When the diesel engine is over heating the black smoke is coming out of the exhaust system, what is most likely the problem?
    A. Too much oil
    B. Air filter

22. The engine intake systems shall be inspected visually at least once each working:
    A. Shift
    B. Day

23. What is the intake system used for on a diesel engine?
    A. To cool the engine
    B. To clean the air before reaching the cylinder

24. The purpose of the lubrication system is to:
    A. Allow combustion to take place when fuel mixes with oxygen
    B. Distribute oil to key areas throughout the engine

25. A multi-viscosity oil can be thinner at lower temperatures to provide:
    A. More horsepower
    B. Easier starting

26. What two valves must be pushed to start a diesel engine using air start?
    A. Starter and oil pressure override
    B. Retry valve and lubricator

27. What should be done daily to the air system of diesel equipment?
    A. Air starter should be checked
    B. Water should be drained from the air tank

28. Air pressure in the safety system is set at:
    A. 200 PSI
    B. 50 PSI

29. What is the main pressure gauge located on diesel machines equipped with an air system:
    A. Operator’s compartment
    B. Engine compartment

30. Oil is used to reduce:
    A. Horsepower output
    B. Friction

(4)
Preventive Maintenance

1. B
2. A
3. A
4. B
5. A
6. B
7. B
8. A
9. B
10. A
11. A
12. B
13. B
14. B
15. A
16. B
17. B
18. B
19. A
20. B
21. B
22. A
23. B
24. B
25. B
26. A
27. B
28. B
29. A
30. B

GOOD HOUSEKEEPING PRACTICES

A. Keep engines free of grease, oil and dust.

B. Fuel spilled shall be cleaned up immediately.

C. Keep the fuel clean and free from contamination.

D. Store oily rags in closed containers.

E. Keep work area free of stumbling hazards.

Note: **Work Safe!!!**

USE OF THE INSTRUMENT
Breaking – off the tips of the Tube

Break off both tips of the DRAGER Tube in the break-off eyelet (Fig. 3). The break off husk (Fig. 4) can also be used for this purpose. This ensures that glass splinters do not fall onto the floor.

Inserting the DRAGER Tube in the Pump

Insert the opened DRAGER Tube in the pump head so that the arrow points toward the pump. The Tube must fit firmly and tightly in the pump head stopper so that no by-pass air can be sucked in (Fig. 5)

Sucking-in the Gas Sample

Hold the pump in the hand with the pump between the thumb and the base of the index finger and the fingers resting on the front plate (Fig. 6).

Compress the bellows completely (Fig. 7) and then release it (Fig. 9).

When the bellows is compressed, the air in it escapes through the outlet valve and not through the Tube, since the Tube has a much higher resistance than the outlet valve. The pump suction operation commences when the fingers are relaxed. The compression springs inside the bellows, which re placed under stress when the bellows is compressed, extend the outlet valve is closed through the vacuum created in the bellows. The air flows through the DRAGER Tube into the bellows while the latter returns to it original volume (Fig. 9). The volume of air sucked-in by the DRAGER Tube is defined by the dimensions and stroke of the bellows. It amounts to 100 cm^3 per stroke. **The end of the suction movement is reached when the limit chain is completely taut**. Since the suction of the pump is caused only by the relaxation of the springs, any subjective influence is excluded.

Consequently, the rate of flow of the air in the DRAGER Tube, which is decisive for the accuracy of measurement, is determined exclusively by the spring force of the pump and the resistance of the tube filling, which is fixed during manufacture. To check that testing takes place correctly, see also the section on “Opening time” in the Tube Operation Instructions. When testing, make the number of pump strokes specified in the Operating Instructions for the Tube concerned.

SUMMARY OF OPERATING INSTRUCTIONS

1. Check the pump for leaks before each series of measurements.

2. Break off tips of the DRAGER Tube in the break-off eyelet (Fig.3) or in the break-off husk (Fig. 4).

3. Tightly insert the DRAGER Tube in the pump head with the arrow pointing toward the pump (Fig. 5).

4. Hold the pump as shown in Fig. 6.

5. Fully compress the bellows (Fig. 7).

6. Straighten the fingers. The suction process takes place automatically and is completed when the limit chain is taut (Fig. 9).

7. Repeat the suction process as often as specified in the Tube Operating Instructions.

8. Evaluate the indication as described in the Tube Operating Instructions.

CODE	NAME OF GAS	SAFE LIMIT	STROKES	COLOR
CO	CARBON MONOXIDE	50 PPM	10	BROWNISH-GREEN
NO	NITRIC OXIDE	25 PPM	10	DARK BLUE-GRAY
NO_2	NITROGEN DIOXIDE	3 PPM	5	BLUISH GRAY
CO_2	CARBON DIOXIDE	5000 PPM	5	BLUE VIOLET
SO_2	SULFUR DIOXIDE	2 PPM	10	WHITE
HCHO	FORMALDEHYDE	1 PPM	10	PINK

TOXIC GAS TESTS

OUTBY EQUIPMENT:

DAILY

1) The air quantity along haulways will be measured and recorded.
2) Air quality measurements for CO_2, SO_3, and NO_2, will be taken on each machine when in operation and recorded.

MONTHLY Air quality measurements for CO_2, SO_3, and HCHO will be taken For each machine and recorded.

TLV's CO-50 ppm, NO-25 ppm, NO_2-3 ppm, CO_2-5000 ppm, SO_2-2 ppm, HCHO-1 ppm

FACE EQUIPMENT:

SHIFT 100% OF FIRST UNITS CFR REQ. + 75% OF SECOND UNIT CFM REQ. + 50% OF EACH ADDITIONAL UNIT CFM REQ. MUST BE MAINTAINED IN EACH L.O.C.C.

DAILY AIR QUALITY MEASUREMENTS FOR CO, NO, AND NO_2 WILL BE TAKEN FOR EACH MACHINE WHEN IN OPERATION WITHIN THE FIRST TWO HOURS OF THE SHIFT AND RECORDED.

AIR QUALITY MEASUREMENTS FOR CO, NO, AND NO_2 WILL BE TAKEN IN THE IMMEDIATE RETRUN WITHIN THE LAST TWO HOURS OF THE SHIFT AND RECORDED.

MONTHLY AIR QUALITY MEASUREMENTS FOR CO_2, SO_2, AND HCHO WILL BE TAKEN ON EACH MACHINE AND RECORDED.

GLOSSARY OF OCCUPATIONAL SAFETY AND HEALTH TERMS

LEL:	Lower Explosive Limit. The minimum concentration at which a gas will explode. A Common unit of measurement is a percent of the LEL.
PPM:	Part Per Million. A common unit of measurement of toxic gases. This term literally Means one part out of one million possible parts.
PEL:	Permissible Exposure Limit. Level of gas in ppm, a worker can be exposed to 8 hours a day.40 hours a week for the rest of his life with no long term health effects. This limit is established by OSHA.
REL:	Recommended Exposure Limit. Term interchangeable with PEL. REL is a term established by NIOSH.
TLV:	Threshold Limit Value. A term used by the ACGIH to signify limits in gas exposure. TLV is usually used as a prefix for TWA and STEL.
TLV-TWA:	Time Weighted Average. The average amount of gas in ppm, a worker can be exposed to over a certain time period. This time is usually defined as 8 hours to represent a normal work day. TWA is a term established by the ACGIH.
TLV-STEL:	Short Term Exposure Limit. The average amount of gas in ppm, a worker can be exposed to in a 15 minute period with no long term health effects. This may occur 4 times a shift with one hour between 15 minutes exposures. STEL is a term established by the ACGIH.
IDLH:	Immediately Dangerous to Life and Health: The maximum concentration of gas in ppm form which a worker could escape within 30 minutes without experiencing any escape-impairing or irreversible health affects. IDLH is a term established by NIOSH.

OXYGEN LEVELS

CONCENTRATION OF OXYGEN	EFFECTS
23.5% Volume	Maximum “Safe Level”; OSHA
23% and Above e	Oxygen enriched, extreme fire hazard
21%	Oxygen Concentration of AIR (20.954)
19.5%	Minimum “Safe Level”; OSHA, NIOSH
17%	Impairment of judgement starts to be detected
16%	First signs of anoxia appears
16-12%	Breathing and pulse rate increase, muscular coordination is slightly impaired
14-10%	Consciousness continuous; emotional upsets, abnormal fatigue upon exertion, disturbed respiration
10-6%	Nausea and vomiting, inability to move freely and loss of consciousness may occur
<6%	Convulsive movements and gasping respiration occurs; respiration stops and a few minutes later heart action ceases

WEIGHTS OF VARIOUS GASES
COMPARED TO AIR

The following gases are lighter than air:

Acetylene
*Ammonia
*Carbon Monoxide
Ethylene
Hydrogen
*Hydrogen Cyanide
Methane

The following gases are heavier than air:

Argon
Butane
Carbon Dioxide
*Chlorine
Ethane
Hexane
Hydrogen Chloride
*Hydrogen Sulfide
Methyl Ethyl Ketone
Methyl Mercaptan
*Nitrogen Dioxide
*Nitrous Oxide
Oxygen
Propane
*Sulfur Dioxide

Note: All gases marked by an * are toxic gases detected by our instruments.

GASES FOUND IN THE MINE ATMOSPHERE

1. Carbon Dioxide. Carbon dioxide (CO_2) is a gas that occurs in normal air at a concentration of about 300 ppm. In mines where diesels are used, this can be expected to increase to 700 ppm of carbon dioxide. However, this gas is not toxic to human beings. Its danger lies in the fact that it can exclude oxygen under certain conditions. With adequate ventilation, carbon dioxide will not normally be of concern in the coal mine atmosphere.

2. Carbon Monoxide. Carbon monoxide (CO) is a gas that properly invokes respect from all that know its properties. It possesses an extremely high affinity for the hemoglobin in the bloodstream and can thus asphyxiate a human being rather quickly if it gets into the human lungs by cutting off the oxygen to the bran and other body organs. Because it is also odorless, diligence in preventing its occurrence in the mine atmosphere is imperative. All internal combustion engines generate certain amounts of CO due to the inability to achieve complete combustion. Fortunately, diesel engines generate rather small amounts of carbon monoxide and careful control of oxygen/fuel ratio and mixing in combustion chamber(s) can keep CO under control. While the time-weighted average exposure limit for CO is not 50 ppm, Table 1 shows that normal exposure is about 10 ppm. Thus, while carbon monoxide is quite toxic, there appears to be no serious threat to health if the current biomedical information is correct.

3. Nitric Oxide. Nitric oxide (NO) is a gas that has similar properties to CO. It causes a chemical asphyxiation of a human being because of its attack upon the oxygen delivery system of the body. Because of its high toxicity, it has been assigned a time-weighted average exposure limit of 25 ppm. Both explosives and diesels can produce NO in a coal mine, but because explosives are not widely used at present, diesel engines will normally be the most important source. NO levels of about 1 to 5 ppm seem to be normal concentrations found in diesel coal mines. As a result, the health ramifications may be of minor concern in most coal operations.

4. Nitrous Oxide. Nitrous dioxide (NO_2) is a gas generated by diesels that can cause pulmonary edema if present in sufficiently high concentrations. The effects can be delayed so that the lungs fill with fluid several days after the exposure. Nitrous oxide is a reactive gas that rather quickly combines with water vapor, the mine surfaces, machine surfaces, and with particles in the air. Diesel coal mine concentrations of this gas are normally well below the threshold limit values of 36 to 84 ppm.

5. Sulfur Dioxide and Other Sulfur Oxides. Sulfur dioxide (SO_2) and other sulfur oxides often designated (SO_x) are common gaseous products caused by the combustion of fuels containing sulfur. These gases are known to cause pulmonary irritation resulting in bronchial constriction and other dysfunction of the pulmonary system. The gases are produced in diesel engines but are not normally in sufficiently high concentrations to cause any problems. In addition, the trend now is toward lower sulfur contents in diesel fuel by choice and this will further reduce the problem in the future.

6. Sulfuric Acid. Sulfuric acid (H_2SO_4) is normally produced along with the other sulfur compounds. The levels of this chemical are usually low but are increased when using a catalytic converter as they are produced during catalysis. The normal levels of this chemical are not considered to be a threat.

7. Hydrocarbons. A number of gaseous hydrocarbons exist in coal seams and are released at the time of mining. Methane is the primary gas so released, but some mines will have minor amounts of other gaseous hydrocarbons. These gases are of importance primarily because they are explosive when present in sufficient quantities but may be of only minor importance with considering health effects.

   Benzene is on the hydrocarbons found in trace amounts in the average diesel exhaust. Its concentration in the mine atmosphere is normally about 0.1 ppm where diesels are used. This is considerably less than the threshold limit value of 10 ppm set by ACGIH some time ago. However, ACGIH has now changed its designation of benzene form a suspected human carcinogen to a known human carcinogen (Anon., 1990). Thus benzene may become more of a concern in the future.

8. Heteroatmoic Organics. This category of organic chemicals includes oxygenated compounds, nitrogen compounds, and sulfur compounds (Anon., 1978).

EMISSIONS TESTING

1. The quantity of ventilating air in the last open crosscut in working sections where diesel powered equipment is used shall be measured and recorded:
   A. Monthly
   B. Daily

2. What does the term TLV represent?
   A. Transmission limit value
   B. Threshold limit value

3. Where shall air quality measurements be made on working sections where diesel powered equipment is operated?
   A. In the immediate intake
   B. In the immediate return

4. The quantity of ventilating air supplied to the working face must be adequate to dilute:
   A. All coal dust
   B. All toxic objectionable constituents

5. The threshold limit value (TLV) of carbon dioxide is:
   A. 3000 PPM
   B. 5000 PPM

6. The threshold limit value of carbon monoxide is:
   A. 70 PPM
   B. 50 PPM

7. The threshold limit value of formaldehyde is:
   A. 4 PPM
   B. 1 PPM

8. Which symbol represents carbon monoxide?
   A. CO^2
   C. CO

9. Which symbol represents formaldehyde?
   A. SO^2
   B. HCHO

10. What is the minimum distance from the exhaust in which air quality checks can be made?
    A. 5 feet
    B. 10 feet

11. What is the maximum distance from the exhaust in which air quality checks can be made?
    A. 5 feet
    B. 10 feet

12. Air quality checks shall be made:
    A. Down wind side of the machine
    B. On the intake side only

(2)
Emission Testing

1. B
2. B
3. B
4. B
5. B
6. B
7. B
8. B
9. B
10. A
11. B
12. A

Diesel Generator Sets

Underground

Although the use of Diesel Generators Power Substations and Power Centers to continuously supply power for mine electrical systems has declined and, today, rarely used, there are basic requirements for these systems which must be complied with by statutory provision. Deviation from the statutory provisions must have a granted 101(c) Petition for Modification in order to be used in the manner which **is on the increase**.

This increased use is to provide power for portable the mobile equipment on the surface of mines and in the process of relocating pieces of electrical equipment underground, i.e., changing equipment from section to section.

Although there are several other requirements in setting up a diesel electric power system, the following are those requirements that are related to the application of running or operating a diesel electrical power system underground. The first portion is for background information.

I. Unit requirements as per 30 CFR 75.701 and 77.701.

A. Metallic frames, casings and other enclosures of electric equipment that can become "alive" through failure of insulation or by contact with energized parts shall be grounded by methods approved by an authorized representative of the Secretary.

II. Unit requirements as per 30 CFR 75.901 and 77.901

A. Low and medium-voltage three-phase alternating-current circuits used underground shall contain either a direct or derived **neutral which shall be grounded through a suitable resistor at the power center, and a grounding circuit, originating at the "grounded side" of the grounding resistor, shall extend along with the power conductors and serve as a grounding conductor for the frames of all the electrical equipment supplies power from that circuit**, except that the Secretary or his authorized representative may permit ungrounded low-and medium-voltage circuits to be used underground to feed such stationary electrical equipment if such circuits are either steel armored or installed in grounded rigid steel conduit throughout their entire length.

B. In addition, 77.901(c) requires that "low-and medium-voltage circuits supplying power to three-phase alternating current stationary electric equipment shall comply with the National Electric Code."

C. Definitions by the National Electric Code:

1. Grounded: Means connected to the earth or to some conducting body which serves in place of the earth. Article 100

2. Grounded Conductor: A system or circuit conductor which is intentionally grounded. Article 100

3. Grounding Conductor: A conductor used to connect equipment or the grounding circuit of a wiring system to a grounding electrode or electrodes. Article 100

4. Grounding Electrode: Underground metallic media to attach one or more grounding conductors. Article 250-81, Article 250-82 & Article 250-83

5. Installation: Electrodes should, as far as practicable, be imbedded below permanent moisture level. Except where rock bottom is encountered, pipes or rods shall be driven to a depth of 8 feet, regardless of size or number of electrodes used. Article 250-83

6. Resistance: Made electrodes shall, where practicable, have a resistance to ground not to exceed 25 ohms. Where the resistance is not as low as 25 ohms, tow or more electrodes connected in parallel shall be used. Article 250-84

III. The requirements for generators, with regard to the items in Item I and Item II, when supplying power to the underground area of a mine from a surface substation.

A. Provided with a **low resistance ground field to earth**; a grounding conductor from the ground field attached to the grounded side of the grounding resistor; and, extending along the power conductor to be used as a frame ground for electric equipment.

B. Section 75.700-1, Approved methods of grounding:

1. A solid connection to a borehole casing have **low resistance to earth**.

2. A solid connection to metal waterlines having **low resistance to earth**.

3. A solid connection to a **grounding conductor, “other than the neutral conductor of a resistance grounded system,” “extending” to a **low resistance ground field** located on the surface.

4. Any other method of grounding, approved by an authorized representative of the Secretary which **ensures that there is no difference in potential** between such metallic enclosures and **the earth.**

IV. The requirements for generators, being used underground, with regard to the items in Item I and Item II, when supplying power to off-board, portable or mobile electric equipment underground.

A. Must be provided with a grounding conductor attached to the grounded side of the grounding resistor, attached to a low resistance grounding medium to earth, or by a method approved by the Secretary or by an authorized representative of the Secretary. Sources: 30 CFR plus the NEC & IEEE referencing generators.

B. Must be provided with a circuit breaker which will open the circuit to the generator prior to reaching the maximum available short circuit current.

V. The purpose of the diesel generator set.

A. As the main power source, to provide an electric power source for all electric equipment at a mine site, in lieu of a substation, or utility supplied power.

B. Supply power to electric equipment in areas where it is difficult, or not cost e effective, to run cables.

C. Move electric face equipment, section equipment, from one section to another, or to start a new section.

D. Operate certain pieces of electric equipment while the installation of a permanent power source is in progress.

VI. Requirements for gen sets used underground.

A. The same as Item I and Item II, if there is no granted 101(c) Petition for Modification.

B. Must be provided with a circuit breaker which will de-energize the power from electric equipment prior to reaching the maximum available short circuit current.

VII. **Alternative Method**. In many cases, it is difficult to impracticable to even attempt to ground the frame of the generator to a low resistance grounding medium due to the distance involved in attaching a grounding conductor in the manner the law prescribes. i.e., 30 CFR cannot be complied with in relation to the above two sections. Without discussing the actual hazards of not providing a frame ground for the generator, Sections 701 and 901 of the surface and underground law **must** be “modified” when **legally** using a generator to move equipment over a distance longer than the equipment trailing cables, or, extremely long and large grounding conductors must be used. An acceptable alternate method, although, not necessarily the only alternate method, is as follows:

A. Low current (typically 90 milliamps, or less) ground fault protection circuits, for the frame of the generator should a breakdown in insulation occur causing power to appear on the generator frame, in lieu of a grounding conductor to a low resistance grounding medium, as afforded by a granted 101(c) Petition for Modification.

B. Circuit diagram for generator systems with granted 101(c) Petitions for Modification with general requirements.

C. Must be provided with a circuit breaker which will de-energized the power circuit prior to the maximum available short circuit current being reached: **and, shut off the generator in the event that a phase to ground fault should occur to the generator frame.**

C. **Open for discussion**!

DIESEL APPROVAL

MAY 1998

Helpful Instructions:

When a Diesel Approval is requested:

- Operator must submit an equipment plan to DM as per 1.1(c) of the R&R.

- The equipment must be inspected and required information obtained. DE-01 and DE-02 forms must be completed.

DE-01 Form

Equipment information can be obtained:
For outby equipment this information can usually be found on a tag somewhere around the operator's deck. It not, try the maintenance manual.
For permissible equipment this information can be found on the MSHA approval plate attached to the machine. See page 3 of permissible equipment checklist.
Engine information can be found on the MSHA certification tag attached to the engine. Sometimes a model number is not listed and can sometimes be found in the maintenance manual.
Emission Test – enter location where the test where taken, air quality and quantity at the location.
Complete and enter the results of the emission tests. All gas concentrations must be below the listed TLV's to obtain approval.

DE-02 Form

General – The equipment must have all these listed items in place as required and pass all listed functions to obtain approval.
Permissible Equipment – (This section applies only to permissible equipment.) These listed items must be in place and pass all listed functions to obtain approval. Listed below are these items and functions and where the inspection procedures can be found in the Permissible Equipment Checklist attached:

- Electrical Component Permissibility – page 4 through 11.
- Emergency Engine Shutdown – page 17
- Flame Arrestors (Intake and Return) – Page 19
- Low-Level Shutdown (Water Bath/Scrubber) – Page 23
- Self-Closing Fuel Cap – Page 26

Conditions – The items listed here must be in place to obtain approval:

- Submittal of equipment plan to DM. This can be completed on the site and submitted to you.
- Instrumentation available to monitor gas emissions for all shiftly and monthly checks.
- Record keeping process established and at the mine.

- Maintenance manual must be available at the mine for this particular piece of equipment.
- Not listed are additional requirements to obtain approval which must be in place:
  * Fuel Letter as per (5.1) of the R&R. Page 5
  * Copy of certification of Certified Diesel Mechanic as per Part III – Section 3.1 of the R&R Governing the Certification of Diesel Mechanics in Underground Coal Mines.

Comments for the DE-01 and DE-02 forms should list information such as new machine (first time approval) or if the equipment is being transferred from another mine and if so, what mine.

When the inspection is completed and all necessary requirements have been met, the operator must be given a completed copy of the DE-01 and DE-02 forms with your signature. These forms are the operator's approval.

NOTE: The operator will not receive any more correspondence from the Division of Mines.

DATE _____

Mr. Frank A. Linkous, Chief
Department of Mines, Minerals and Energy
PO Drawer 900
Big Stone Gap, VA 24219

Dear Mr. Linkous:

Permission is hereby requested to use the following piece of diesel powered equipment:

Type of Equipment: _____

Manufacturer: _____
Model Number: _____
Mine Index Number: _____
MSHA Approval Number: _____ PERMISSIBLE ONLY _____

underground in the coal mine listed below:

Company Name: _____
Mine Name/Number: _____
Mine Index Number: _____
MSHA I.D. Number: _____

In accordance with Title 45.1, Section 480-05-9.2, Part I, 1.1,C.-Rules and Regulations Governing the Use of Diesel Powered Equipment in Underground Coal Mines the following plan is hereby submitted.

This unit of diesel powered equipment will be used as _____
outby/face
equipment in the _____
(area of mine)

The mine is ventilated with a _____ system and the
(blowing/exhaust)

ventilation air quantity will be maintained in accordance with Part II, 2.5, 2.6 and 2.7 of Section 480-05-9.2.

Current air readings at this mine include:

General

* Section #: _____
* (face equipment only)

Main Intake _____ cfm
Main Return _____ cfm
Neutral _____ cfm

Intake _____ cfm
Return _____ cfm
Last Open Crosscut _____ cfm

The projected quantity of diesel fuel to be used by the piece of equipment in a 24 hour period is _____ gallons. Fuel storage and handling will be maintained in accordance with part VI., 6.1-6.12 of Section 480-05-9.2.

All sections of Title 45.1 including associated Rules and Regulations of the Mining Laws of Virginia will be complied with at all times.

Company Official: _____

Title: _____

DM-DE-03-04-95

Rules and Regulations
Governing the Use of Diesel Equipment
In Underground Coal Mines
VR 480-05-9.2

The Virginia Diesel Regulations have been revised and are presently in the review-approval process and are scheduled to be finalized in 1999.

When approved, the revised regulations will be placed in this manual.

Substantial updates and changes have been made based on identified needs and recent approval of MSHA diesel regulations.

The number of diesel units used in underground coal mines in Virginia is Growing rapidly attributed mainly to versatility, safety and productivity.

RULES AND REGULATIONS GOVERNING THE USE OF DIESEL POWERED EQUIPMENT IN UNDERGROUND COAL MINES
VR 480-05-9.2

AS ADOPTED BY THE CHIEF
DIVISION OF MINES
DEPARTMENT OF MINES, MINERALS AND ENERGY
COMMONWEALTH OF VIRGINIA

EFFECTIVE JUNE 16, 1985
AMENDED JANUARY 2, 1991

Issued By
The Department of Mines, Minerals and Energy
The Bookbindery Building
2001 West Broad Street
Richmond, Virginia 23220

480-05-9.2
Rules and Regulations Governing the Use of
Diesel Powered Equipment in Underground Coal Mines

PART I
GENERGAL REQUIREMENTS

§ 1.1 A. Diesel powered equipment will not be permitted underground without the written approval of the Chief of the Virginia Division of Mines. The approval of use shall incorporate all the requirements of these regulations.

B. If at any time the Chief determines that any condition or practice permitted under this approval may threaten the health or safety of the employees, he may impose additional requirements for the purpose of eliminating the condition or practice.

C. The operator shall submit to the Virginia Division of Mines a plan which shall contain the ventilation plans as to the quantities of air in the area where the diesel units are to be operating and the number of diesel units which the operator plans to operate. (if in the future the operator exceeds the projected number of units, another amendment must be submitted.) Also, this plan must contain the projected quantities of diesel fuel to be used in a 24 hour period. (Adjustments to the quantities of fuel may be amended by the Chief of the Division.)

§ 1.2 No diesel powered equipment shall be placed in initial operation underground without a check for approval by the state mine inspector. The mine inspector shall report to the Chief in writing as to the permissibility, ventilation, air quality of toxic gases, the mine operator's name, type of equipment, serial number, and MSHA certification number where applicable.

§ 1.3 All non-face diesel powered equipment used underground shall meet the requirements and be maintained and operated in accordance with the requirements of the Code of Federal Regulations, Title 30, Chapter I, Part 32, Revised as of July 1, 1983.

§ 1.4 All mobile diesel powered equipment operated inby the last open crosscut and in return air courses shall be permissible and shall be maintained and operated in a permissible condition as defined by the Code of Federal Regulations, Title 30, Chapter I, Part 36, Revised as of July 1, 1993.

§ 1.5 Engine adjustments shall be verified by a statement by the engine manufacturer or by the manufacturer's stamped nameplate as being correct before each diesel powered machine is initially operated in a coal mine.

§ 1.6 Alteration in design, substitution of components or assemblies, or changes in conditions of operating diesel powered machines hall not be made without prior concurrence of the Virginia Division of Mines. When such changes are permitted, additional engine tests and adjustments shall be required as necessary to ensure the safe operation of the particular machine in a coal mine.

§ 1.7 The engine of diesel powered equipment shall not be left idling unattended.

§ 1.8 All employees working in mines where diesel powered equipment is used shall be furnished with a filter type self-rescuer or equivalent which they shall carry at all times while on duty in the mine.

§ 1.10 The engine of any diesel powered machine shall not be capable of starting unless the transmission control are in the neutral position.

§ 1.11 Stationary diesel powered equipment or installations shall not be permitted underground without a plan submitted by the operator and the written approval of the Chief of the Division of Mine. The plan shall address ventilation, fire protection, and fuel storage and handling.

PART II
PROPER VENTILATION

§ 2.1 The use of diesel powered machines underground shall be restricted to haulageways and working places where positive ventilation is maintained by mechanical means.

§ 2.2 The ventilating air in all mine workings where diesel powered machines are operated shall not contain combustible or other contaminating gases in such concentration that will affect combustion in the diesel engine by materially increasing production of toxic, poisonous or other objectionable constituents in the engine exhaust.

§ 2.3 Each set of producing entries in which diesel powered equipment is used shall be placed on a separate split of air.

§ 2.4 The air supplied for ventilation where diesel powered machines are used shall contain not less than 19.5 percent by volume of oxygen (dry basic) and not more than 1.00 percent by volume of methane.

§ 2.5 The quantity of ventilating air to be maintained in the last open crosscut where multiple units re operating in a working section shall be at least 100 percent of the air quantity specified on the approval plate of the first diesel unit (the unit requiring the highest air quantity on it approval plate) plus 75 percent of the approval plate air quantity for the second diesel unit and 50 percent of the approval plate air quantity of each additional diesel unit operating in the split of air. The quantity of ventilating air in the last open crosscut in working sections where diesel powered equipment is used, shall be measured and recorded daily.

§ 2.6 The quantity of ventilating air supplied to the working face must be adequate to dilute all toxic and objectionable constituents of the engine exhaust to such extent that the composition of the air meets the air quality standards stipulated in §§ 2.8 and 2.15.

§ 2.7 The quantity of ventilating air to be maintained along haulageways for outby diesel powered equipment must be adequate to dilute all toxic and objectionable constituents of the engine exhaust to such extent that the composition of the air meets the air quality standard stipulated in §2.8 and 2.15. The quantity of ventilating air along haulageways where diesel powered equipment us used shall be measured and recorded daily.

§ 2.8 The air quality in which diesel powered equipment is operated shall be sampled to Determine that the composition of the air is within safe limits with respect to CO, NO, and NO2. These safe limits are currently defined as being equal to or less than The following Threshold Limit Values (TLV):

	TLV
Carbon Monoxide (CO)	50 ppm
Nitrogen Dioxide (NO2)	3 ppm
Nitric Oxide (NO)	25ppm

§ 2.9 Air quality measurements specified in § 2.8 shall be taken at least once per shift for each diesel powered machine when it is in operation. The measurements must be taken on the downwind side of the machine not closer than five feet and not greater than ten feet from the exhaust in the middle of the entry midway between the mine roof and the mine floor. Machine(s) exceeding the TLV must be repaired, removed from service or the quality of air coursed over the machine(s) be increased to reduce gas concentrations to levels at or below the TLV.

§2.10 Air quality measurements shall also be taken in the immediate return for each working section at lest two times per shift, (once during the first two hours of the shift) while the unit(s) of diesel powered equipment being employed in the section during the shift are in normal operation. Where test results show levels above the established TLV, the diesel powered equipment shall be shut down until the problem is corrected. When the diesel powered equipment is returned to service, air quality tests shall be made to determine that the equipment is in compliance.

§ 2.11 If the engine exhaust becomes more noticeable than normal, required air quality tests shall be made. If the results of the air quality tests are not in compliance the equipment shall be shut down until the problem is corrected. When the equipment is returned to service, air quality tests shall be made to determine that the equipment is in compliance.

§ 2.12 Frequency of air quality or quantity measurements may be reduced or increased by written notice from the Chief if he feels that the performance and compliance records of the operator warrant such action.

§ 2.13 Air quality measurements may be taken by several recognized methods such as gas concentration indicator tubes or direct readout instruments approved for such use or other such methods as may be developed and subsequently approve in the future for taking such measurements. These testers shall be provided and maintained by the operator.

§ 2.14 All tests required in Part II of these regulations shall be taken by a competent person designated by the operator and the results of these tests shall permanently recorded and kept in a designated place for at least one year. When the test results show excursions above the TVL, the corrective measures taken to attain compliance must also be recorded. These records will be made available for inspection by interested persons during normal working hours.

§ 2.15 The air quality in which diesel powered equipment operated may be affected by constituents other than other those stipulated in § 2.8. The operator shall at least once per month perform air quality measurements to ensure safe limits with respect to Carbon Dioxide (CO2), Sulfur Dioxide (SO2) and Formaldehyde, These safe limits are currently defined as being equal to or less than the following Threshold Limit Values (TLV):

	TLV
Carbon Dioxide (CO2)	5000ppm
Sulfur Dioxide (SO2)	2ppm
Formaldehyde	1 ppm

PART III
FIRE PROTECTION FOR DIESEL POWERED EQUIPMENT

§ 3.1 Each mobile diesel powered machine shall be equipped with a self-contained dry chemical or liquid carbon system or no less effective system approved by the Virginia Division of Mines.

§ 3.2 Stationary diesel powered equipment must be equipped with an automatically activated dry chemical or carbon dioxide system or no less effective system approved by the by the Virginia Division of Mines.

§ 3.3 Nozzles and reservoirs shall be placed in accordance with the manufacture's specifications to provide maximum protection to the fuel tank compartment, motor compartment, battery compartment and hydraulic tanks.

PART IV
MAINTENANCE OF DIESEL MACHINES

§ 4.1 Maintenance of diesel powered machines shall be performed by competent persons designated by the operator.

§ 4.2 A. Engine intake and exhaust systems shall be inspected visually at least once each working shift.

B. Permissible and emission components of diesel powered machines shall be inspected in accordance with the instructions of the manufacturer or applicable requirements of the law.

C. Records shall be kept of inspections for at least one year and shall be made available for inspections by interested persons.

§ 4.3 Maintenance and repair work on permissible and emission components shall be done in accordance with the instructions of the manufacturer or applicable requirements of the law. Records of maintenance and repair work on permissible and emissions components shall be recorded in a permanent notebook and shall be maintained for a minimum of one year in a designated location open for inspection by interested persons.

§ 4.4 Maintenance manuals shall be made available for review by interested persons.

PART V
FUEL USAGE: SPECIFICATIONS

§ 5.1 The fuel for diesel engines of machines approved for service in underground mines shall be a low volatile hydrocarbon fuel classified as ASTM D975 No. 2D diesel fuel with a flash point of 125 degrees Fahrenheit or greater at standard temperature and pressure, and shall contain sulfur in a concentration of 0.25 percent of less by weight. The mine operator shall maintain on the mine site, and make available for inspection, a statement certifying the sulfur content of the diesel fuel to be used underground. Where diesel fuel with a sulfur content of 0.25 percent of less by weight is not readily available, the Chief may grant a variance to use other fuels for approved diesel machinery.

§ 5.2 Fuel filters on diesel engines shall be cleaned regularly, replaced or repaired promptly as conditions require.

PART VI
FUEL USAGE; STORAGE AND HANDLING

§6.1 Fuel taken underground shall be transported only in strong metal type containers that are provided with efficient closing devices or other suitable methods approved by the Chief.

§ 6.2 Fuel taken underground and awaiting transfer to diesel powered machine fuel tanks shall be stored in a closed compartment or container constructed of incombustible material and shall be kept in a well ventilated location.

§ 6.3 Fuel shall be transferred from the storage compartment to a machine fuel tank through flexible hose that is fitted with a self-closing valve. However, this does apply to portable hand held containers of five gallons or less.

§ 6.4 The fuel handling system and the diesel powered machine shall be frame grounded when fuel is being transferred from the storage compartment to the machine fuel tank. However, this does not apply to portable hand held containers of five gallons or less.

§ 6.5 The air vents on fuel handling equipment shall be flameproof. However, this does not apply to portable hand held containers of five gallons or less.

§ 6.6 When fuel is being transferred from a storage compartment to the machine fuel tank the diesel engine on the piece of equipment being fueled shall be stopped.

§ 6.7 A supply if sand or other suitable incombustible material shall be available during the transfer of fuel from a storage compartment to the machine fuel tank for absorbing spilled fuel. Fuel spilled shall be cleaned up immediately.

§ 6.8 In order to prevent unintentional opening, all drain plugs in the fuel handling system shall be threaded and sealed, locked in the “closed” position, or protected by location.

§ 6.9 Only persons designated by the operator shall be permitted to handle fuel for diesel powered machines.

§ 6.10 In fuel handling operations precautions shall be observed to keep the fuel clean and free from contamination by foreign material such as dirt, sediment and water.

§ 6.11 Diesel fuel storage and handling in a working section shall comply with the following:

A. Only once diesel fuel center will be permitted to be in permanent residence.

B. Diesel fuel may be stored in combination with and/or in the same area as the hydraulic oil, lubricating oil, and greases.

C. One 20 pound approved ABC fire extinguisher and 200 pounds of rock dust per 100 gallons of diesel fuel stored shall be maintained at the storage area.

D. The storage shall be vented directly to the return.

E. Storage shall be limited to a typical 24 hour supply not to exceed 500 gallons.

§ 6.12 Diesel fuel storage for the mine shall comply with the following:

A. The underground storage area shall be vented directly to the return.

B. One 20 pound approved ABC type fire extinguisher and no less than 200 pound of rock dust per 100 gallons of fuel storage shall be available at the underground mine storage area.

C. Storage underground shall be limited to a typical 48 hour supply for all Normally operating diesel units in the mine.

4 VAC 25-20-190 Underground diesel engine mechanic.

A. All maintenance work performed on diesel engines used to power equipment in underground coal mines shall be performed by, or under the direct supervision

of, a person possessing a Diesel Engine Mechanic Certificate issued by the BCME. In addition, no operator if an underground coal mine in the Commonwealth of Virginia may use diesel-powered equipment in the mine without first employing a diesel engine mechanic who is certified by the BCME.

B. "Maintenance" shall include all of the tasks required to be performed routinely to ensure that the engine exhaust emissions conform with the requirements of the law and regulations of Virginia and MSHA, and with the maintenance recommendations of the manufacturer of the engine.

C. Applicants shall posses six months experience as a diesel engine mechanic, Complete a diesel engine mechanic course approved by the division, or posses appropriately related work experience approved by the chief. A one-yea diesel engine mechanic program approved by the division may be substituted for the diesel engine mechanic experience.

D. Applicants shall pass the underground diesel mechanic, first aid, and gas examinations.

E. The initial training course for diesel engine mechanics shall include at least 32 hours of classroom instruction and be taught by a certified instructor.

F. To qualify for approval by the chief, the content of the initial training course for diesel engine mechanics shall include, but is not limited to:

1. Diesel engine principles;
2. Diesel fuel and fuel systems;
3. Engine exhaust systems;
4. Tate and federal diesel laws and regulations;
5. Safe use of equipment;
6. Emission controls, testing procedures and recordkeeping; and
7. Protection of health and workers exposed to diesel equipment.

G. The annual continuing education course for diesel engine mechanics shall include at least four hours of classroom instruction and be taught by a certified instructor.

H. The content of the continuing education course shall include, but not be limited to:

1. Diesel technology.
2. State and federal diesel laws and regulations.
3. Safe use of equipment.
4. Protection of the health or workers exposed to diesel equipment; and
5. Required emission test procedures and recordkeeping.

I. A Diesel Engine Mechanic Certificate shall remain valid until December 31 following the anniversary date of the initial training, providing the certification requirements are met, unless the certificate is revoked by the BCME.

J. The holder of the certificate shall renew the certificate by satisfactorily completing a diesel engine mechanic continuing education course approved by the Chief and taught by a certified instructor.

K. The holder of the certificate shall submit documentation to the division indicating the required continuing education has been completed before the expiration of the card.

L. Failure to complete the required education shall result in suspension of certification pending completion if continuing education. If the continuing education requirement us not met within two years from the suspension date, Then the certification shall be revoked by the BCME.

M. The division shall send notice of any suspension to the last known address that the certified person reported to the division in accordance with 4VAC 25-20-20 I and to the last known employer address.

4 VAC 25-20-20. Diesel engine mechanic instructor.

A. Applicants shall have teaching experience and be a certified diesel engine mechanic or possess appropriately related work experience approved by the chief.

B. Applicants shall maintain the certificate by teaching at least one approved diesel engine mechanic course every two years or at least one approved diesel engine mechanic continuing education course every year.

C. Documentation shall be submitted to the division indicating the required teaching has been completed.

D. Failure to complete the required teaching shall result in suspension of the Certification. Applicants may meet the teaching requirement by teaching under The supervision of a certified diesel mechanic engine instructor. If the teaching requirement is not met one year from suspension, then certification shall be revoked by the BCME.

E. The division shall send notice of any suspension to the last known address That the certified person reported to the division in accordance with 4 VAC 25-20-20 I and to the last known employer address.

November 3, 1997

MEMORANDUM FOR ALL ENFORCEMENT PERSONNEL

FROM: RAY MCKINNEY
District Manager

SUBJECT: Diesel Law

The following Diesel regulations are effective November 25, 1997:

1. Ventilation 75.325 (f-k) includes new requirements for inclusion in mine ventilation plan (75.371);

2. Exhaust Gas Monitoring 70.1900;

3. Fuel Storage and Handling 75.102-75.1906;

4. Fuel Storage Facility Fire Suppression 75.1912

5. Maintenance 75.1914

6. Training 75.1915;

7. Particulate Index and Air Quantity for Part 36 Engines 75.1907(b)(4).

On and after the effective date, please ensure compliance with these new requirements as they apply to your assigned mines.

MSHA: CMS&HRMCKINNEY: acm:11/03/97:540-679-0230

Compliance Guide for MSHA'a
Regulations on Diesel –Powered Equipment
Used on Underground Coal Mines

U.S. Department of Labor
Alexis M. Herman, Secretary

Mine Safety and Health Administration
J. Davitt McAteer, Assistant Secretary

October 1997

Approval Requirements

Mandatory Health Standards

Approval Requirements

30 CFR Part 7, Subpart E—Diesel engines intended for use in underground coal mines

Q. What does an engine manufacturer need to do to get an existing diesel engine approved under new subpart E in part 7?

A. In order to obtain MSHA approval for an existing engine under subpart E of part 7, the engine manufacturer must submit specific information to MSHA, including engine drawings, details on engine combustion, timing, etc., and the results of the tests and examinations required under subpart E. MSHA will expedite the processing of part 7 approvals for existing engines in machines currently in use in underground coal mines.

Q. If a manufacturer applies for MSHA approval under subpart E of part 7 for an existing engine that already has minimum ventilating air quantity specified on its approval plate, and the minimum air quantity calculated under the part 7 test us different from what is already on the approval late, will the approval plate itself be replaced or modified to reflect this change?

A. Permissible diesel-powered equipment approved under subpart 36 currently has an approval plate that lists a minimum ventilating air quantity. As of November 25, 1997m all part 36-approved machines must have a minimum ventilating air quantity determined in accordance with subpart 7. MSHA has arranged to have part 7, subpart E tests conducted for four of the engines that are the most widely used on part 36-approved equipment and a revised minimum ventilating air quantity determined. The revised air quantities for these four engines will be available on the Internet at MSHA's Home Page (http://www.msha.gov/S&HINFO/DESLREG) or by contacting MSHA's Approval and Certification Center at (304) 547-2051.

If the minimum ventilating air quantity calculated under part 7 is different from what is already specified on the approval plate, a new approval plate must be obtained. Equipment manufacturers should distribute new approval plates with the revised quantities to owners of this equipment.

All nonpermissible engines must be approved under part 7 as of November 25, 1999 and have a minimum ventilating air quantity determined as part of the approval process, which must be displayed on the engine approval plate. Nonpermissible engines approved under now-revoked part 32, which may have an approval plate displaying an air quantity determined under part 32, do not comply with this requirement, and must be approved under part 7 and display a part 7 approval plate by the 1999 deadline.

Q. Will engine testing conducted under part 7 be open to the public?

A. The final rule does not give the public a right to witness the engine tests. However, there is nothing to prevent the manufacturer from opening the testing to the public, if it chooses to do so.

Q. Why does MSHA require methane to be added to the intake air during testing of category A engines under part 7?

A. Category A engines must be designed to operate safely in face areas and return air courses where methane may be present. Thus, Category A engine testing performed with 1.0 percent methane injected into the intake air. The methane acts as additional fuel in the engine, which affects the fuel-to-air-ratio. This change in fuel-to- air-ratio increases emissions levels, especially carbon monoxide and oxides of nitrogen.

Q. Under the final rule, how will diesel engines approved under part 7 be identified? Us it acceptable under the new regulations if the approval plate on existing equipment is located in the operator's compartment?

A. Diesel engines approved under part 7 will display an approval plate to indicate their approved status and also to indicate the minimum ventilating air quantity for that engine. Part 36 equipment that is equipped with a power package approved under part 7 will have three approval plates: one on the engine indicating that it has been approved under subpart E of part 7; one on the power package indicating that it has been approved under subpart F of part 7; and one on the machine (which will generally be located in the operator's compartment) indicating that the equipment has been approved as a fully assembled machine under part 36.

Approval Requirements

30 CFR Part 7, Subpart E—Diesel engines intended for use in underground coal mines.

Q. What does an engine manufacturer need to do to get an existing diesel engine approved under new subpart E in part 7?

A. In order to obtain MSHA approval for an existing engine under subpart E of part 7, the engine manufacturer must submit specific information to MSHA, including engine drawings, details on engine combustion, timing, etc., and the results of the test and examinations required under Subpart E. MSHA will expedite the processing of part 7 approvals for existing engines in machines currently in use in underground coal mines.

Q. Under the final rule, how will diesel engines approved under part 7 be identified? Is it acceptable under the new regulations if the approval plate on existing equipment is located in the operator's compartment?

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Q. What if the approval plate is on the engine, and the mine operator moves that engine to a different piece of equipment?

A. If the approval plate reflects a part 7 engine approval and is moved into a different piece of nonpermissible equipment, the approval plate should remain on the engine. Before a new engine is installed in a part 36-approved machine, the mine operator must ensure that the engine has been approved for use in that machine. This information may be obtained either from the equipment manufacturer of from MSHA's Approval and Certification center.

Q. Does the final rule allow existing part 36 engines to be used until the end of their useful life? With regard to nonpermissible (outby) equipment, if an engine is sent out to be rebuilt, which requirements must it meet?

A. Engines in existing part 36-approved equipment may continue to be used in underground coal mines. However, the revised part 36 minimum ventilating air quantity is applicable unless and until the equipment must be approved under part 7 and displays a new part 7 approval plate obtained from the manufacturer. Engines in nonpermissible diesel-powered equipment must be approved under subpart E of part 7 by November 25, 1999, After that date, nonpermissible engines must be rebuilt to approved condition, meeting the specifications of subpart E of part 7.

Q. Will existing part 32 engines meet the part , subpart E, category B requirements when the requirements take effect on November 25, 1999?

A. Existing part 32-approved engines may continue to be used in equipment operating in underground coal mines after November 25, 1999 only if the engine manufacturer obtains formal MSHA approval under subpart E of part 7. As a practical matter, drawings from the part 32 approval may be used by the engine manufacturer in obtaining part 7 approval if the drawings are representative of the current version of the engine. Additional testing will be required under part 7, however, to determine the engine's particulate index and gaseous emissions.

Q. We have a number of parts drawings which apply to "Schedule 24" equipment bearing the notation "… must not be changed without approval by MSHA." Is it correct to assume that his notation can be ignored?

A. Yes. That notation no longer has any significance. Part 31 (so-called "Schedule 22") and part 32 (so-called "Schedule 24") were revoked by the final rule and no longer exits as MSHA regulations. MSHA has stopped processing new approvals and will no longer consider changes to approvals issued under these two parts.

A part 31 or 32 approval plate does not give a machine any special status. Specifically, part 31-approved permissible locomotives are not permitted in areas where permissible electrical equipment is required. Equipment is those areas must no have a part 36 approval.

MSHA, however, will retain all part 31 and 32 approval records to assist other government agencies, whose regulations may reference either part, in determining if certain machines still meet the conditions of approval.

Q. If an engine has been approved under subpart E of part 7, is it acceptable for a mine operator to remove the approval plate until November 25, 1999?

A. Under §75.1907(b)(4), equipment approved under part 36 must have a particulate index and a dilution air quantity determined in accordance with Subpart E of part 7 by November 25, l997. If part 36-approved equipment has been provided with an engine approved under part 7, the approval plate should remain of the engine to indicate that his requirement has been satisfied. Nonpermissible equipment is not required to be provided with part 7-approved engines until November 25, 1999, and minimum ventilating air quantities will not be required for nonpermissible equipment until that requirement takes effect in 1999. In the meanwhile, nothing in the final rule would prohibit the removal of the approval plate on nonpermissible equipment. MSHA, however, does not encourage this practice.

30 CFR Part 7, subpart F—Diesel power packages intended for use in areas of underground coal mines where permissible electric equipment is required.

Q. Will the requirements for §7.98(j) for non-sparking starting mechanisms require a field modification or SNAP on some existing equipment? If so, a bronze starter gear may not be available for all current equipment. Are there other alternatives?

A. No. Under the final rule, existing equipment already approved under part 36 is not required to be retrofitted to comply with the power package requirements of part 7, subpart F. As no retrofit is needed, no field modification or SNAP is needed. As a practical matter, many of the component systems on existing part 36 equipment already meet the new requirements in part 7, subpart F.

For diesel equipment manufacturers who may wish to convert the design of the certified component systems on existing part 36 equipment to comply with the new permissible power package requirements, there is an alternative to the bronze starter gear specified – an automatic interlock in the starting system to prevent engagement of the starter while the engine is running.

Q. Are there any requirements for existing part 36 equipment that may require equipment alterations or retrofits to comply with the new regulations?

A. New requirements that do apply to existing part 36 equipment, and which may therefore necessitate equipment retrofits, are set forth in § 75.1907(b). Paragraph (b) (1) requires that, as of April 25, 1997, this equipment have safety component system that limits surface temperatures to those specified in subpart F of part 7 (i.e., 302 !F, 150 !C). All part 36 equipment used in underground coal mines already meets this requirement, so no retrofit or other action by the mine operator is needed.

Paragraph (b)(2) requires existing part 36 equipment to be provided with a manual or automatic fire suppression system that complies with §75.1911 by November 25, 1999. Section 75.1911 requires that fire suppression system actuation shut off the engine. Some changes to the safety shutdown system may be required to allow this, which will require a SNAP or a field modification. However, some manufacturers have already built this option into their certified component systems. In these instances, mine operators can make the modification to comply with the §75.1911 requirement. Existing § 75.342 has also been revised to require methane monitors on certain types of diesel-powered equipment by April 25, 1997, which will require similar modifications to the safety shutdown systems. Again, some safety component manufacturers have already had this option evaluated and offer systems with the optional shutdown capability. If this is not the case, some form of MSHA review or approval would be required. MSHA encourages equipment manufacturers to apply for extensions of approval for part 36 equipment and to include the shutdown feature for the fire suppression system and methane monitor as options in applications for approval of power packages under subpart F of part 7.

Paragraph (b)(3) requires existing part 36 equipment to be provided wit a braking system that meets specified requirements in §75.1909 by November 25, 1999. Most existing Part 36 equipment is already equipped with brakes that meet these requirements.

Paragraph (b)(4) requires that, effective November 25, 1997, a particulate index and dilution air quantity, in accordance with subpart E of part 7m be determined for part 36 equipment that is manufactured before November 25, 1999.

Paragraph (b)(5) does not apply to existing part 36 equipment.

Finally, existing regulations at §75.1710 and 75.1710-1 have been revised to require cabs or canopies on diesel-powered face equipment no later than April 25, 1997. Cabs and canopies are not subject to MSHA approval and may therefore be added to diesel-powered equipment without Agency action.

Q. Is there any overspeed protection provided in 0ower packages under this subpart?

A. There is no requirement for automatic overspeed protection. However, an equipment operator has the ability to manually shutdown equipment with an intake air shutdown device in addition to the normal fuel shutoff, if necessary.

Q. Isn’t there a potential to blow head gaskets if the intake air shut-off valve closes while the engine is running?

A. There is a potential to damage the engine if the intake air shutdown device, which is designed to be closed in the event of an emergency, is activated while the equipment engine is running. However, the risk of equipment damage is offset by the protection provided by the operation of the emergency safety device, which is designed to stop the engine and serves as a backup in the event that the normal fuel shutoff mechanism fails.

For purposes of weekly equipment maintenance, a test procedure has been developed that will allow the emergency shutdown device to be checked without causing engine damage. This test procedure is set forth below.

Emergency Intake Air Shutoff Test Procedure

Warning: The following test procedure must be followed to test the operation of the emergency intake air shutoff valve. Failure to follow this procedure can result in extensive damage to engine components and personal injury.

If a diesel particulate filter and high exhaust gas temperature sensor are installed, remove the sensor and filter element. Failure to do so can result in damage to the sensor and may result in the ignition of the filter element.

Test Procedure:

1. Shut off the water make-up supply.
2. Drain the scrubber by removing the drain plug.
3. Disconnect the pressure line to the scrubber float valve and plug. Start the engine.
4. Operate the engine at full throttle until no water remains in the scrubber (water stops draining from the drain port)
5. Release the engine throttle allowing the engine to idle.
6. Actuate the emergency air intake shutoff control. The engine must shut down immediately (engine speed must decrease continuously until the engine stops).
7. Replace the drain plug, reconnect the pressure line to the scrubber float, open the water make-up valve and refill the scrubber with water. Replace the high exhaust gas temperature sensor and diesel particulate filter, if applicable.

MSHA is working with manufacturers to modify their permissibly checklists to include this test procedure. MSHA has already worked with some manufacturers to modify checklists to address thus concern and will work with others who submit applications for new approvals, or who wish to modify existing permissibility checklists.

Q. With respect to §7.103(b)(3), do all currently approved vehicles have exhaust gas temperature sensors? If not, will these require a field modification of SNAP?

A. Existing part 36 equipment does not need to be retrofitted to comply with the power package requirements in subpart 7. No retrofit would be required, and therefore no SNAP or field modification would be needed. However, existing part 36 equipment may need to be retrofitted to comply with §75.1907(b), which requires existing pat 36 equipment to be

provides with certain features by specified deadlines. These requirements re explained in more detail above.

Q. Section 7.97(a)(10) refers to a "power package checklist" which will be much more detailed than the checklist referred to in §75.1914 relating to in-mine maintenance. Will MSHA clarify what "checklist" is contemplated for operator maintenance?

A. MSHA has reviewed existing permissibility checklists that are part of the documentation for equipment that has already been approved by MSHA under part 36. MSHA has identified specific items that should be covered during the weekly equipment examination required under §75.1914, and forwarded this information to manufacturers of the great majority of diesel equipment used in underground coal mines. MSHA intends that the scope of weekly examinations of diesel-powered equipment under §75.1914 will be similar in scope to the weekly examinations of electrical performed under existing regulations.

MSHA anticipates that equipment manufacturers will be submitting modified checklists to MSHA for review and incorporation into their equipment's approval documentation. Although equipment manufacturers are responsible for making the revised checklists available to their customers, MSHA has begun to publish lists of the approval numbers of equipment whose checklists have been modified through this process. This information is also available on MSHA's Internet Home Page, from MSHA district offices, and from MSHA's Approval and Certification Center.

MSHA has also prepared a generic weekly checklist that may be used to supplement existing permissibility checklists until they re revised, or in instances where a revised checklist may not be available. The generic checklist will be distributed shortly as an MSHA Program Information Bulletin, and will also be available on MSHA's Home Page.

30 CFR Part 36 – Approval requirements for permissible mobile diesel-powered equipment.

Q. Is there a maximum capacity for fuel tanks in permissible diesel-powered equipment?

A. The limit of fuel tank capacity for permissible diesel-powered equipment is the amount of fuel needed to operate the equipment at full load for approximately four hours.

Q. Will diesel-powered equipment previously approved under part 36 maintain its approved status, or will the equipment have to be reapproved under part 36 as it has been revised by the final rule?

A. Under the final rule, existing equipment already approved under part 36 is not required to be reapproved under revised part 36 or retrofitted to comply with the power package requirements of part 7, subpart F. However, certain modifications to part 36 equipment are required by the final rule, and some may require changes to the existing approval by the manufacturer or a field modification by the mine operator.

New requirements that apply to existing part 36 equipment, and which may therefore necessitate equipment retrofits, are set forth in § 75.1907(b). Paragraph (b)(1) requires that, as of April 25, 1997, this equipment have a safety component system that limits surface temperatures to those specified in subpart F of part 7 (i.e., 302 □ F, 150□ C). All part 36 equipment used in underground coal mines already meets this requirement, so no retrofit or other action by the mine operator is needed.

Paragraph (b) (2) requires existing part 36 equipment to be provided with a manual or automatic fire suppression system that complies with § 75.1911 by November 25, 1999. Section 75.1911 requires that fire suppression system actuation shut off the engine. Some changes to the safety shutdown system may be required to allow this, which will require a SNAP or a field modification. However, some manufacturers have already built this option into their certified component systems. In these instances, mine operators can make the modifications to comply with the § 75.1911 requirement.

Existing § 75.342 has also been revised to require, as of April 25, 1997, methane monitors on certain types of diesel-powered equipment, which will require similar modifications to the safety shutdown systems. Again, come safety component manufacturers have already had this option evaluated and offer systems with the optional shutdown capability. If this is not the case, some form of MSHA review or approval would be required. Existing regulations at §§ 75.1710 and 75.1710-1 have been revised to require cabs or canopies on diesel-powered face equipment by April 25, 1997.

Paragraph (b)(3) requires existing part 36 equipment to be provided with a braking system that meets specified requirements in § 75.1909. Most existing Part 36 equipment is already equipped with brakes that meet these requirements.

Paragraph (b) (4) requires a particulate index and dilution air quantity, in accordance with subpart E of part 7, to be determined by November 25, 1997 for part 36 equipment manufactured before November 25, 1999. As previously stated, this information is now available for four of the most widely used permissible engines, and MSHA expects that equipment manufacturers will provide new approval plates for these machines.

Paragraph (b)(5) does not apply to existing part 36 equipment.

Q. Does the surface temperature limit for equipment (302 □ F) apply to engine components or to the entire piece of equipment, such as dry disc type brakes?

A. The surface temperature limit applies only to power packages and to the certified electrical components.

Q. Approval plates were not required on engines for equipment approved under part 36. How does a mine operator obtain approval plates for engines that are already in currently approved part 36 equipment?

A. The final rule does not require engine approval plates on currently approved part 36 equipment. New equipment approved under revised part 36 for diesel equipment used in coal mines will incorporate power packages approved under subpart F of part 7, which will be provided with engine approval plates.

Mandatory Health Standards

Section 70.1900 – Exhaust gas monitoring

Q. Section 101(c) of the Mine Act allows modification of safety standards, but not health standards. The exhaust gas monitoring requirements in this rule are published as part of MSHA's mandatory health standards under part 70. Therefore, a modification of this standard would not be allowed. Does MSHA plan to move these requirements and include them with the mandatory safety standards in § 75.325 so a petition can be filed?

A. Section 70.1900 provides for the monitoring of CO and NO_2, gaseous components of diesel exhaust that can adversely affect miners' health. These requirements are properly published with other MSHA health-related standards in part 70. As specified by the standard, flexibility is provided to accommodate the different operations and ventilation systems at individual mines. MSHA has no plans to move these requirements to part 75.

The required on-shift measurements of CO and NO_2 provide a check on all of the systems put in place to provide reasonable assurance that miners are not overexposed to diesel exhaust gases. The final rule allows a mine operator to obtain approval for a higher action level if the mine operator can establish that a higher action level will maintain continuous compliance with applicable TLV®s.

Q. Does any of the sampling required by state agencies satisfy the exhaust monitoring requirements of the final rule?

A. Some states require sampling of diesel-powered equipment at a specified distance behind the equipment tail pipe. This type of sampling does not comply with the requirements of the final rule. However, if a state exhaust monitoring requirement is essentially identical to the requirements of the final rule (in the location, frequency, and method of sampling), this monitoring would be accepted by MSHA as compliance.

Q. Is exhaust gas monitoring required in all areas of the mine where diesel-powered equipment is operated?

A. No. Under § 70.1900(a), exhaust gas monitoring is required: in the return on each section where diesel-powered equipment is used; at the loading point of the section if diesel haulage equipment is used; and inby the last piece of diesel equipment on the longwall face where equipment is being installed or removed. However, the district manager has the authority to designate additional areas for monitoring if necessary. These additional areas will be identified in the mine's ventilation plan.

Q. Why does the final rule require a CO and NO_2 reading once each shift at the section loading point? For mines using belt air at the face, why would the return air sample not suffice for this requirement?

A. The final rule requires exhaust gas monitoring at the section loading point because it is an area where exhaust gases can easily accumulate to excessive levels during dumping operations.

Q. What criteria will be used by district managers in establishing additional sampling points?

A. The intent of the rule is to allow designation of additional sampling points where miners are at risk of being overexposed to gaseous diesel contaminants. Areas where this may be a concern, such as refueling locations and construction sites, could be designated as additional sampling locations by the district manager.

Q. Is there a specific point during the shift when the on-shift monitoring of exhaust gases must be conducted.

A. The final rule provides that exhaust gas monitoring may be done at any time during the shift, so long as the sample is collected during periods that are representative of conditions during normal operations. MSHA intends that these tests be made when diesel-powered equipment is being used as it typically is during the mining process. This means, for example, that sampling would be appropriate when diesel haulage equipment is moving coal or diesel-powered roof bolters are installing bolts.

Q. If more than one unit of diesel-powered equipment is operating on a section, how is an exhaust gas check conducted that is "representative", as required by § 70.1900(b)(3)?

A. The purpose of the monitoring requirements is to gauge the performance of the diesel exhaust control system under normal operating conditions. MSHA intends that tests for carbon monoxide and nitrogen dioxide by made when diesel-powered equipment is being used as it typically is during the mining process. The exhaust gas check may therefore be made at a different time in the shift than during the on-shift examination conducted under § 75.362.

Q. Is there a specific location in the air stream or entry where the samples must be taken?

A. The exhaust gas monitoring required under the final rule is intended to check the entire system of diesel exhaust control, not just the quality of the exhaust from an individual machine. Consequently, the sample should be taken in a location where the exhaust gases have mixed with the mine atmosphere and where the sample will be representative of the diluted diesel exhaust.

Q. Is more than one sample required during a shift if additional diesel-powered equipment is operated after a sample has already been taken?

A. If additional equipment is brought into the section for more than a quick excursion, such as to bring supplies up to the section, it may be necessary to take another sample, to ensure that the sample is representative of the equipment being operated on the section during that shift.

For example, if the check is made while three ram cars are being operated on the section, and a fourth ram car is brought up to the section and operated along with the other three, another check probably needs to be made. If the equipment operation will have an impact on miners' exposure to diesel contaminants, another check should be made.

Q. If diesel-powered equipment, such as a forklift, is being used on the section in addition to electric haulage equipment, is exhaust monitoring required?

A. The answer to this question depends on whether the diesel-powered equipment goes inby the loading point. If the diesel equipment does not go inby the loading point, sampling would be necessary only if it is required as an additional sampling point by the district manager under § 70.1900 (a)(4), and specified in the ventilation plan.

Q. If a mine has a split ventilation system, does the final rule require exhaust gas monitoring on each section?

A. Yes

Q. If equipment is operated inby the feeder, is the equipment still considered section equipment?

A. Yes

Q. If a unit of diesel-powered equipment goes inby the tailpiece, but not inby the last open crosscut, does the final rule require exhaust gas monitoring in the immediate return?

A. In this situation, the final rule requires exhaust gas monitoring in the immediate return.

Q. At what location should exposure monitoring be conducted on the inby side of a longwall recovery operation?

A. Exposure monitoring should be conducted as far inby of the equipment as possible. It should be noted that this would not necessarily be inby the recovery site.

Q. If the equipment can be excluded from the air quantity calculation in § 75.325, can the equipment be excluded from the exhaust gas monitoring requirements of § 70.1900, when it would only be running for a couple of hours a day?

A. No. Under the final rule, if diesel-powered equipment is being used inby the section loading point, exhaust gas monitoring is required on the section on that shift. The purpose of the exhaust gas monitoring required by the final rule is to check the entire system to ensure that diesel exhaust gases are being controlled and are not causing overexposure to miners.

It should be noted that the final rule does not require exhaust gas monitoring of equipment used outby the section, unless the outby location is identified for exhaust gas monitoring by the district manager and specified in the mine ventilation plan.

Q. What are the requirements for exhaust gas monitoring for diesel-powered equipment operated in outby areas?

A. The final rule does not specifically designate outby areas for exhaust gas monitoring. However, the district manager has the authority to require sampling in other areas, including outby areas, if necessary. These additional areas are required to be specified in the mine ventilation plan. Outby equipment would be required to have an exhaust gas check only if the district manager has designated that in the ventilation plan as a place to sample. It is important to note that the exhaust gas monitoring required by § 70.1900 is not checking the emissions of the machine, but the effects of diesel emissions of the mine atmosphere.

Q. Is exhaust monitoring required on the longwall face if a diesel-powered scoop is being operated there?

A. Yes.

Q. The final rule requires exhaust monitoring to be conducted by a "certified person." What is the definition of a "certified person"?

A. Section 70.1900(a) requires that exhaust gas monitoring be conducted by a certified person as defined by § 75.100. A certified person under § 75.100 is a person who has been certified as a mine foreman (mine manager), an assistant mine foreman (section foreman), or a preshift examiner (mine examiner), either by the State in which the coal mine is located, or by the Secretary of Labor.

Q. Does the final rule require exhaust monitoring on shifts when no diesel-powered equipment is being operated on the section?

A. No. Exhaust monitoring of the section is not required during shifts when no diesel-powered equipment is operating.

Q. May bottle samples be used to satisfy the exhaust monitoring requirements of this section?

A. No. Section 70.1900(b)(1) specifically requires that exhaust monitoring results be available immediately to the person collecting the samples. Results of bottle samples are not available immediately, and are typically sent to a laboratory for analysis. Use of bottle samples would therefore not comply with this requirement.

Q. Must the monitoring device be an instantaneous read-out device, or can it be one that samples over an 8-hour period?

A. The monitoring device must give immediate results to the individual taking the measurement. The device can sample over an 8-hour period if the current gas concentration can be determined as an instantaneous reading at the time the gas check is being made.

Q. Can existing atmospheric monitoring systems (AMS) be sued to satisfy the exhaust gas monitoring requirement?

A. Yes, provided that the sensors are located where the samples must be taken and the results are immediately available. This can be achieved if the sensor has a digital readout at the sampling location. The requirement could also be satisfied if the person conducting the monitoring calls out to the system control room for the CO and NO_2 measurements at the appropriate sensors at the appropriate time.

Q. When referring to TLV® levels in § 70.1900, does MSHA mean the short term exposure limit (STEL), the ceiling level, or the TWA levels for an eight-hour period?

A. References to TLV® in § 70.1900 mean 50 parts per million (ppm) for carbon monoxide (CO), which is the eight-hour limit, and 5 ppm for nitrogen dioxide (NO_2), which is both the eight-hour and the ceiling limit.

Q. The final rule incorporates by reference the 1972 TLV®'s of the American Conference of Governmental Industrial Hygienists (ACGIH), which have been updated and revised several times since 1972. Why did MSHA not use the most recent edition of the TLV®'s?

A. The ventilating air requirements for diesel-powered equipment in the final rule are designed to maintain gaseous diesel exhaust contaminants to within permissible limits; that is, whatever MSHA air quality regulations currently require. The air quality standards that currently apply in underground coal mines are the 1972 TLV®s, incorporated by reference in MSHA regulations at § 75.322. If any of the limits for diesel exhaust gases are modified, MSHA would expect to undertake rulemaking to incorporate those changes into § 70.1900. MSHA also would expect to go through rulemaking to modify the levels specified in subpart E of part 7 to which gaseous contaminants must be diluted in determining a diesel engine's ventilating air quantity.

Q. Will MSHA issue citations when the action level is exceeded during exhaust gas monitoring?

A. No. Under the final rule, simply exceeding the action level would not be a violation and would not be cited. However, the final rule requires corrective action in response to a measurement over the action level. If corrective action is not taken, a citation would be issued.

Q. What types of "appropriate corrective action" would MSHA consider to be sufficient once the action level has been exceeded?

A. A properly designed ventilation system, along with effective equipment maintenance, should prevent the action level from being exceeded. If the action level is exceeded, then the flaw in the system needs to be identified and corrected. In instances where the action level has been exceeded, corrective action could include, but is not limited to:

- Checking, and reducing if necessary, the number of diesel engines operating on the section or operating in the area;

- Observing the operating diesel engines to determine if any are producing visible smoke, and performing corrective maintenance;

- Checking to ensure that the ventilating air quantity is sufficient, and making necessary adjustments; and

- Testing individual diesel engines to determine if any engine is producing high levels of exhaust gases as compared with the levels measured during previous maintenance checks.

MSHA anticipates that in almost all cases mine operators will discover an obvious cause, e.g., an engine in need of attention or a ventilation problem.

Q. Could "immediately tak[ing] appropriate corrective action" include personal sampling to determine whether the TLV®s for CO and NO_2 are being met?

A. MSHA would consider such sampling to be part of the operator's corrective action, as long as the mine operator intended to use the sampling results to support adjustment of the action level.

Q. Will some mines have a higher action level than other mines?

A. This is possible under the final rule. The rule allows mine operators to obtain approval for actions levels higher than the 50 percent action level specified in § 70.1900(c). The purpose of the action level is to ensure that miners are not being overexposed to gaseous diesel exhaust contaminants, by requiring corrective action before contaminant levels exceed maximum limits. A mine operator who wishes to have the action level raised above the 50 percent level must demonstrate that miners will not be overexposed to diesel exhaust contaminants at the higher action level.

Q. Over what period of time must a mine operator conduct personal sampling for diesel exhaust gases to obtain approval of a higher action level by the MSHA district manager?

A. The answer to this question depends on the specific circumstances in each case. The data submitted by the mine operator to support a higher action level should demonstrate that a higher action level will not result in overexposures to miners under all foreseeable mining conditions. Sampling should provide data representative of normal operating conditions sufficient to make an informed decision.

Q. What are the criteria that must be satisfied by a mine operator to be granted a higher action level?

A. In order for MSHA to approve a higher action level, the data must demonstrate that an increased action level will continue to ensure that miners are not being overexposed to Gaseous diesel contaminants. If a mine operator can demonstrate that compliance with the TLV®s is maintained at the same time that the gaseous contaminant levels in the return air course are greater than the 50 percent action level, the district manager may increase the action level.

Q. Who takes samples for CO and NO_2 to support a higher action level, the operator or MSHA?

A. Typically, the mine operator will be requesting a higher action level, and it would be the mine operator's responsibility to supply information, such as sampling results, to support a higher action level. After evaluation of the operator's supporting information, MSHA may determine that Agency sampling is needed. Therefore, both the operator and MSHA may take samples as part of a request for a higher action level, depending on the specific circumstances in each case.

Q. Who takes samples for CO and NO_2 to support a higher action level, the operator or MSHA?

A. Typically, the mine operator will be requesting a higher action level, and it would be the mine operator's responsibility to supply information, such as sampling results, to support a higher action level. After evaluation of the operator's supporting information, MSHA may take samples as part of a request for a higher action level, depending on the specific circumstances in each case.

Q. When does the final rule require a record of the results of exhaust gas monitoring?

A. Results of exhaust gas monitoring are required to be recorded only if they exceed the applicable action level. Results that exceed the action level must be recorded because they indicate that there is something that needs attention, such as poorly maintained equipment or a ventilation system that is not functioning correctly. A record will alert mine management and miners that there is a problem. The final rule also requires that the record reflect the corrective action taken.

Q. Does the final rule specify where exhaust gas monitoring results must be recorded?

A. The regulations require that exhaust monitoring records be made part of and in the same manner as the records for hazards detected during the on-shift examination under § 75.363. This means that the records should be kept in the on-shift examination book.

Mandatory Safety Standards

Section 75.325 - - Air quantity

Q. Does the air quantity calculation under §75.325(g) include the approval plate air quantity of diesel-powered equipment operating outby the section?

A. The approval plate air quantity of equipment operating outby the section would not be included in the calculation for operating sections, because the multiple unit formula only includes equipment operating on the section. However, in areas where mechanized mining equipment is being installed or removed, equipment operating outby must be included in the initial calculation under paragraph (g) if it is ventilated by intake air on that split. IF the equipment in fact does not significantly affect the exposure of miners to diesel exhaust, equipment may be excluded from the calculation under paragraph (h) (4). The equipment exclusion must be approved by the district manager and specified in the ventilation plan.

Q. Under the final rule, where must air quantity measurements be made in outby entries?

A. The final rule specifies where these measurements are to be made in §75.325 (f) (3) and (4). In areas of the mine developed prior to April 25, 1997, the minimum ventilating air quantity must be maintained in any air course with single or multiple entries where the equipment is being operated outby the section loading point. Therefore, air quantity measurements are to be made in all the common entries, and the total air quantity in all the entries must be at least the minimum air quantity. These measurements can be performed anywhere along these entries. In areas of the mine developed on or after April 25, 1997 air quantity measurements may be made anywhere in the entry. The air reading should be taken without the equipment being present in the entry so that a determination is made of the normal airflow.

Q. Does the final rule require the adding together of the approval plate air quantities of multiple units of diesel-powered equipment in outby entries?

A. The minimum ventilating air quantity in an entry outby the section loading point would be the approval plate air quantity of the machine with the highest quantity. If all three units have the same approval plate quantity, one single unit approval plate quantity is required. This air quantity is not included in the minimum ventilation air quantity required on the working section.

However, the approval plate air quantity of equipment working outby will be included in the minimum air quantity calculation if the equipment is being operated in an area where mechanized mining equipment is being installed or removed.

Q. Before the final rule went into effect, ventilation plans typically took the "100-75-50" approach for ventilating diesel-powered equipment, meaning that minimum ventilating air quantities were calculated by using 100 percent of the greatest equipment approval

plate quantity, 75 percent of the next highest, and 50 percent of all other equipment approval plate quantities. The final rule now requires 100 percent of all approval plate air quantities. Was there a problem with the old system?

A. The new formula in the final rule recognizes that approval plate air quantities are calculated differently under part 7 than they were under part 36 prior to the promulgation of this final rule. Under subpart E of part 7 an engine's approval plate air quantity will be determined by the amount of air needed to dilute gaseous diesel exhaust contaminants (CO, CO_2, NO, and NO_2) to permissible limits. Up until the final rule, approval plate quantities were determined by the amount of air needed to dilute contaminants to 50 percent of the limits that were in effect when part 36 was first promulgated in 1961. Although the levels to which CO and NO_2 must be diluted remain the same under the final rule, the dilution levels for NO and CO_2 are twice as high. Consequently, less air will be needed to dilute these two gases to the higher levels, and the approval plate quantity will be lower under part 7 for most if not all engines. However, the approval plate quantity will now directly correspond to the applicable contaminant limits. It follows that 100 percent of the approval plate quantity, rather than some fraction thereof, must be provided to adequately dilute the gaseous diesel contaminants.

Q. If a diesel-powered machine is equipped with technology that reduces exhaust emissions, will MSHA take this into account and calculate a reduced approval plate air quantity?

A. MSHA will consider the effectiveness of exhaust gas controls in setting the engine's approval plate air quantity, provided that the device is integral to the engine design and is part of normal production engines.

Q. If a device that reduces exhaust emissions is available and is installed on a diesel-powered machine, may this information be used as the basis for excluding the equipment's approval plate air quantity under §75.325 (h) (4)?

A. If diesel-powered equipment is provided with a device that reduces exhaust emissions, this may provide the basis for excluding the equipment's approval quantity under §75.325 (h) (4). It should be noted, however, that equipment's approval plate air quantity may only be excluded from the air quantity calculation for multiple units of equipment under §75.325 (g). The final rule does not provide for exclusion for single units of equipment.

Q. How will the requirements for minimum ventilating air quantities in outby areas be enforced during the 3-year phase-in of the approved engine requirement, when some engines may have approval plate air quantities determined under part 7 subpart E, and some will not?

A. Nonpermissible equipment is required to be provided with an engine that has been approved under subpart E of part 7 and which has had a minimum ventilating air quantity determined and display on an approval plate no later than November 25, 1999. Until that deadline, the ventilation requirements for diesel-powered equipment in § 75.325 will apply only to permissible equipment approved under part 36.

Q. For longwall installations and removals, what is the "area" where the minimum ventilating air quantity must be maintained and what outby haulage equipment, such as locomotives, would be considered to be "in the area" during longwall moves, and thus included in the air quantity calculation?

A. This means that all diesel-powered equipment (consistent with the phase-in schedule) operating in the intake air split of the longwall panel, because it contributes to miners' exposure to diesel exhaust emissions, must initially be included in the ventilating air quantity calculation for longwall installations and removals. The final rule would then allow for exclusion of individual pieces of equipment if they do not significantly affect the exposure of miners.

Longwall installations and removals are typically periods when diesel equipment is working continuously under load in a confined area, and where diesel exhaust emissions are particularly high. In such a situation, all equipment that has the potential to contribute to miners' exposure to contaminants must be considered initially. If there are legitimate grounds for certain pieces of equipment working in the "area" to be excluded from the calculation, mine operators should seek such an exclusion from the district manager.

Q. What is the required minimum ventilating air quantity in multiple entries?

A. In areas of the mine developed on or after April 25, 1997, the minimum air quantity would be required in the entry where the equipment is being operated. In areas of the mine developed before April 25, 1997, the minimum air quantity must be provided in the air course. Where there are multiple common entries, the sum of the air quantity in all the common entries must be at least the minimum quantity.

Q. Is the approval plate air quantity required at the section loading point only if the equipment being used is in the production mode?

A. No. Section 75.325 (f) (2) requires that the approval plate air quantity be maintained at the section loading point during any shift that the equipment is being operated on the working section. This provision responds to concerns that loading points are one of the locations were excessive levels of diesel contaminants are a particular problem. Whether or not the mine is in the production mode is irrelevant.

Q. If diesel-powered equipment performs loading work, what does the final rule require the minimum ventilating air quantity for this equipment?

A. A determination of the minimum ventilating air quantity for individual units of diesel-powered equipment depends on where the equipment is being operated, not he work the equipment is performing. If the equipment is operating in a working place, the approval plate air quantity is required in that working place. If the equipment is operated on the working section, the approval plate air quantity would be required as the minimum ventilating air quantity at the loading point.

Q. If a belt move is taking place, where is the loading point?

A. During a belt move the loading point is in the process of being moved, and therefore there would be no loading point for purposes of the ventilating air quantities required by §75.325 (F) (2). Consequently, the minimum ventilating air quantity would be required in that location only after the loading point has been set up and production has resumed.

Q. Has the agency considered what effect the increased ventilating air quantities required by the final rule are going to have on dust control, specifically dust scrubbers on continuous mining machines?

A. As a practical matter, the ventilating air quantities required by the final rule for diesel-powered equipment should not present such a problem. Only one diesel-powered machine will typically be behind the continuous miner at any given time, and the minimum ventilating quantity of air for that machine will be less than 10,000 cubic feet per minute, which is an air quantity that commercially available dust scrubbers can handle.

In some cases, the air quantity necessary to adequately ventilate diesel haulage equipment might not be consistent with the discharge quantities of the scrubber currently in place at a particular operation. If a mine operator elects to use diesel face haulage in conjunction with a scrubber for the continuous miner, the systems should be compatible.

Other conventional dust controls can be used should the quantity of air be incompatible with dust scrubbers. These include the use of fan spray systems, the use of line curtain/tubing to within 10 feet of the face, or the replacement of the scrubber with a higher capacity unit. If a scrubber is utilized with an exhausting line curtain, the excess quantity of air may be directed so that it does not flow over the continuous miner.

It is not acceptable to forgo effective ventilation of diesel-powered equipment and the control of harmful diesel exhaust contaminants to accommodate the ventilation requirements of dust scrubbers.

Q. Ventilation of diesel-powered equipment in outby entries will vary depending on whether the equipment is in an entry that was developed before or after April 25, 1997. Does the final rule require mine operators to submit a mien map showing areas that had been developed as of April 25, 1997, to facilitate compliance with this provision.

A. No. The final rule does not require submission of a mine map showing that information.

Q. What is the definition for the term "working place" as it is used in §75.325 (f) (1)?

A. The term "working place" is defined in §75.2 for purposes of part 75, and means the area of the coal mine inby the last open crosscut.

Q. How much ventilating air is required for a permissible diesel scoop in the return air course?

A. The minimum ventilating air quantity for a diesel-powered scoop operating in a return air course would be the approval plate air quantity of the scoop.

Q. Why will approval plate air quantities determined under subpart E of part 7 be generally less than the quantities determined under part 36?

A. The minimum ventilating air quantity for a diesel-powered scoop operating in a return air course would be the approval plate air quantity of the scoop.

Q. Why will approval plate air quantities determined under subpart E of part 7 be generally less than the quantities determined under part 36?

A. Approval plate air quantities will be calculated differently under part 7, subpart E, than they had been under part 36 prior to the issuance of this final rule. An engine's approval plate quantity under the final rule will be determined by the amount of air needed to dilute gaseous contaminants to the TLV®s in §75.322. Up until now, approval plate quantities had been determined under part 36 based on the amount of air needed to dilute gaseous contaminants to 50 percent of the TLV®s that were in effect in 1961, when part 36 was first promulgated. Although the levels to which CO and NO_2 must be diluted remain the same under the final rule, the dilution levels for NO and CO_2 are twice as high. Consequently, less air will be needed to dilute these two gases to the higher levels, and the approval plate quantity will be lower for most, if not all, engines. However, the approval plate quantity will now directly correlate to existing TLV®s.

Approval plate quantities may also be slightly lower than under old part 36, as a result of the revision in part 36 that requires engines to be tested with 1.0 percent methane into the engine air intake, rather than 1.5 percent methane that was used before the final rule went into effect. Because injection of methane into the engine increases engine emissions, the lower concentration of methane used under the final rule will require a lower quantity of air to dilute.

Q. Section 75.325 (h) (4) provides for the exclusion from the air quantity calculation of "other equipment having duty cycles such that the emissions would not significantly affect the exposure of miners. What are some examples of "other equipment"?

A. Equipment that may be eligible for exclusion includes equipment with a very small engine (less than 10 horsepower), or heavy-duty equipment that is operated infrequently, for very short periods of time, or when other diesel equipment normally operated on the section is shut down or not operating. An example of equipment that could be considered for exclusion is a supply vehicle that is driven up to the section, shut down and unloaded, started up and immediately driven off of the section. Equipment that is operated in a location so that its exhaust does not pass over miners could also be eligible for this exclusion. Other examples include a roof bolter that is always operating on the opposite side of the section in a fish tail ventilation system, and a lube unit that goes onto a section only to refuel the section equipment.

Q. How will MSHA distinguish between light-duty and heavy-duty applications in determining whether to include or exclude individual pieces of equipment in the air quantity calculations in §75.325(g)?

A. All diesel-powered equipment, either operating on the working section or in the area where mechanized mining equipment is being installed or removed, whether light duty or heavy duty is initially included in the air quantity calculation under paragraph (g). Mine operators

who believe there is a basis for excluding particular pieces of equipment from the calculation because of the way they are operated may seek to have that equipment excluded.

Section 75.342 - - Methane monitors

Q. What specific types of diesel-powered equipment are required to be equipped with methane monitors?

A. The final rule now requires methane monitors on diesel-powered ". . . face cutting machines, continuous miners, longwall face equipment, loading machines, and other mechanized equipment used to extract or load coal within the working place." See, 30 CFR §75.342. "Working place" is defined in §75.2 as 'the area of a coal mine inby the last open crosscut." Loading machines would include scoops and other diesel powered machines used to load coal from inby the last open crosscut, but would not include clean-up scoops, consistent with the application of this requirement to electric equipment.

Q. Can you operate diesel powered equipment in 1 percent methane?

A. This rule does not change existing requirements for action at specified methane levels, as set out in §75.323. The requirements of §75.323 apply equally to diesel-powered equipment and electric equipment.

Section 75.371 - - Mine ventilation plan; contents

Q. Do we need to address exhaust gas monitoring on outby diesel-powered equipment in the ventilation plan?

A. No. The final rule does not specifically require monitoring of outby equipment. However, the district manager has the authority to designate a sampling point in outby areas, which must be included in the approved ventilation plan. For more detailed guidance on the final rule and ventilation plan approval, see Chapter 8 of MSHA's Handbook on Ventilation System and methane and Dust Control Plans.

Section 75.1710 and 75.1710 – 1 - - Cabs and canopies

Q. What diesel powered equipment is required to have canopies and cabs?

A. The final rule requires canopies or cabs on diesel-powered face equipment, including shuttle cars. A cab or canopy is required on diesel-powered equipment if the same type of electrically powered equipment is required to have one. MSHA approval is not required to add a canopy to permissible diesel-powered equipment.

Section 75.1900 - - Definitions

Q. If the section has a temporary fuel storage area, are the temporary fuel storage tanks required to be wheel-mounted?

A. Yes

Section 75.1901 - - Diesel fuel requirements

Q. How will the mine operator demonstrate compliance with the requirements for sulfur content and flash point? Will the mine operator be required to test the fuel?

A. The rule requires that, upon request, the mine operator provide to an authorized representative of the Secretary evidence that the diesel fuel purchased for use in diesel-powered equipment underground meets these requirements. A mine operator may provide documentation from the fuel supplier to demonstrate that the fuel's sulfur content complies with the standard. MSHA may also elect to have a sample of the diesel fuel analyzed in order to confirm the actual sulfur concentration. For further information about this subject, please refer to MSHA Program Information Bulletin No. P97-17, which addressed Documentation of Diesel Fuel Content.

Q. Will a single material safety data sheet (MSDS) or letter from a fuel supplier satisfy the requirement that the mine operator present evidence that the diesel fuel meets the sulfur and flash point specifications?

A. Yes, so long as the necessary information is included in either document that has been provided by the current fuel distributor. However, if, for example, the mine operator was to change fuel distributors, a new MSDS or letter would be necessary.

Q. Is the color of the diesel fuel indicative of the sulfur content?

A. The color of diesel fuel cannot be used as evidence that the fuel meets the sulfur content limitation. The Environmental Protection Agency (EPA) has advised MSHA that fuel coloration indicates only if a fuel tax has been paid.

Q. Additives are flammable by themselves. Can flammable fuel additives be used if they are registered by EPA?

A. The rule prohibits the use of additives if they have a flash point that is less than 100□ F. Under §75.1901(b), flammable liquids may not be added to diesel fuel used in diesel-powered equipment in underground coal mines. The intent of the rule is to prevent the use of additives that lower the flash point of the diesel fuel and to specifically prohibit the use of gasoline as an additive. Typically, EPA-registered additives do not contain flammable compounds.

Q. May alternative fuels be used in diesel-powered equipment in underground coal mines? For example, there is a new alternative fuel made up of up to 50 percent water and 50 percent naphtha. Would it be considered diesel fuel?

A. This rule covers commercially available diesel fuels meeting EPA on-highway fuel requirements. Anything classified as a diesel fuel by the EPA would be acceptable.

Section 75.1902 - - Underground Diesel Fuel Storage - - general requirements

Q. If equipment is being installed or removed, isn't it true that there is no real loading point?

A. The final rule addresses this issue by providing that temporary underground diesel fuel storage areas must be located within 500 feet of: the actual loading point; the last loading point, for areas where equipment is being removed; or the projected loading point, for areas where equipment is being installed.

Q. On an outby project using diesel-powered equipment, would a diesel fuel storage facility located within 500 feet of the project site be acceptable as a temporary fuel storage area, since there is no loading point?

A. The final rule does not permit storing of diesel fuel anywhere other than in a temporary fuel storage area or a permanent storage facility. A temporary storage area must be located within 500 feet of: 1) the section loading point; 2) the projected loading point, in cases where equipment is being installed; or 3) the last loading point, in cases where equipment is being removed.

Q. If a fuel transportation unit stays in the same location and does not move, will it have to be parked in a permanent storage facility? What if the existing temporary storage area is not located within 500 feet of the section loading point?

A. The fuel transportation unit must be parked in either a permanent fuel storage facility or a temporary fuel storage area when not in use. The temporary storage area must be located within 500 feet of the section loading point.

Q. Under the final rule, are any of the diesel fuel handling and storage requirements grandfathered?

A. No. All diesel fuel handling and storage facilities in underground coal mines must comply with the requirements of the final rule no later than November 25, 1997.

Q. Under paragraph (e), permanent underground diesel storage facilities may not be located in escapeways. Can they be located in crosscuts off the primary escapeways and/or in intake entries adjacent to primary escapeways if the operator takes the same precautions as those that are taken with respect to the location of compressors in such areas?

A. Permanent underground diesel fuel storage facilities may not be located in the primary escapeway [§75.1902(e)] and must be ventilated with air that is coursed to the return or the surface and not allowed to further ventilate a working place [§75.1903(a)(4)]. A permanent underground diesel fuel storage facility may be located in a crosscut off of the primary escapeway or in an entry adjacent to the primary escapeway, provided that the facility is physically separated from the escapeway by the noncombustible construction, and the air that has ventilated the storage facility is coursed to the return or the surface, and does not ventilate a working place. Automatic closing doors that typically remain open would not provide the necessary degree of separation.

Q. What are some examples of acceptable collision protection on diesel storage facilities? Would fuel tanks that meet the U.S. Department of Transportation standard for collision protection be considered "protected from collision" under this rule?

A. Stationary tanks in fuel storage facilities must be protected from damage by collision with other mine vehicles. One method of achieving this is through the installation of curbs or posts. The Department of Transportation design specifications for the fuel carrying tank on cargo tank motor vehicles (fuel trucks) exceed the requirements in this rule for the actual tanks on diesel fuel transportation units. However, the rule's requirement that tanks be protected from damage by collision imposes an additional requirement, beyond design specifications for the tanks themselves.

Q. Is the distance of 500 feet from the loading point measured as a straight line or measured around the coal pillars?

A. The 500-footdistance is measured in a straight line (a 500-foot radius) from the loading point.

Q. Can you have two temporary fuel storage areas on a "super section" (i.e., fish tail with two MMUs)?

A. No. Only one temporary fuel storage area is allowed. Although a "super section" may operate with two MMUs, the section has only one belt line and one intake escapeway. This limitation is intended to allow fuel storage in close proximity to the mining section, while at the same time recognizing that safety concerns necessitate the limitations be placed on where fuel may be stored.

Q. Can one diesel fuel transportation unit be brought to a temporary fuel storage area to refuel another fuel transportation unit, or is this prohibited by the limitation of one diesel fuel transportation unit per section?

A. This would be allowed under the final rule. The rule prohibits more than one diesel fuel transportation unit from being parked at a time in a temporary fuel storage area. A diesel fuel transportation unit that is actively refueling equipment, another diesel fuel transportation unit, or a storage tank is not considered to be parked.

Q. The restriction of one temporary underground diesel storage area per section or per area where equipment is being installed or removed could be construed to mean that temporary diesel fuel storage is permitted only in those areas. Will temporary diesel storage areas be allowed in outby areas for short time periods and if attended at all times?

A. Section 75.1902(c)(1) limits the location of temporary underground fuel storage areas. However, diesel fuel transportation units may be brought into other areas, including outby areas. The final rule provides that diesel fuel transportation units that are "not in use" must be parked either in a permanent underground fuel storage facility or in a temporary diesel fuel storage area. The phrase "not in use" means that the unit is not being trammed or used to dispense fuel or lubricants or waiting to refuel another piece of equipment.

Q. If a mine has a piping system from the surface but does not have a borehole fill tank, and does not plan to build a permanent underground fuel storage facility, what are the options?

A. Under the final rule, a diesel fuel piping system from the surface may only transport fuel to a stationary tank or a diesel fuel transportation unit, either of which must be located in a permanent underground fuel storage facility (§75.1905-1(g)). The final rule provides no exceptions to this requirement.

Section 75.1903 - - Underground diesel fuel storage facilities and areas; construction and safety precautions

Q. What is the difference between requirements for temporary underground fuel storage areas and for permanent underground fuel storage facilities?

A. Only one temporary diesel fuel storage area is allowed per working section, and it must be located within 500 feet of the loading point, the last loading point, or the projected loading point. There is no limit on the number of permanent fuel storage facilities, and the facilities' location is not tied to the section loading point.

Permanent fuel storage facilities, unlike temporary fuel storage areas, may not be located in the primary escapeway.

The temporary fuel storage area may provide storage for no more than one diesel fuel transportation unit, which may contain no more than 500 gallons of diesel fuel. A permanent fuel storage facility may store a total of 1,000 gallons of diesel fuel in stationary tanks, and may also be used to park any number of diesel fuel transportation units. Permanent fuel storage facilities are the only location underground where safety cans may be stored.

Finally, permanent fuel storage facilities, unlike temporary fuel storage areas, must be: constructed of noncombustible material; provided with either self-closing door or a means for automatic enclosure; be provided with a means of containment for 150 percent of the capacity of the fuel storage system; and be equipped with an automatic fire suppression system that complies with §75.1912.

Q. Are double wall storage tanks acceptable as a "means of containment" under §75.190.(a)(6)?

A. No. The requirements for a "means of containment" capable of holding 150 percent of the maximum capacity of the fuel storage system is intended to control the spread of fuel where, for example, a valve breaks off and the fuel is leaking out. A double wall tank would not serve this purpose.

Q. Could a concrete stopping or a competent rock footwall serve as a "means of containment" under §75.1903(a)(6)?

A. Whether a concrete stopping or a competent rock footwall would quality as a means of containment would depend on whether either method would effectively contain a fuel spill.

Q. Does the "means of containment" have to be located right at the facility, or can the spillage be directed away from the storage tank to another area?

A. The means of containment must be an integral part of the permanent fuel storage facility and provide containment for 150 percent of the capacity of the fuel storage system

Q. With respect to §75.1903(a)(6) requiring containment capability in permanent storage facilities equal to 150 percent of the maximum capacity of the fuel storage system (including the surface), would the requirement apply even if the surface storage facilities are equipped with shut-off devices to prevent uncontrolled flows into the underground system?

A. Yes. The requirement for 150 percent containment capacity applies to fuel kept in surface storage facilities equipped with shut-off devices and delivered underground through a piping system. This is because the requirement for a means of containment addresses the consequences of fuel spills, which shut-off devices cannot prevent.

Q. Is a fire suppression system required for storage tanks for a battery-operated fuel center?

A. Yes. All permanent underground diesel fuel storage facilities must be provided with a fire suppression system that meets the requirements of §75.1912. additionally, all non-self-propelled diesel fuel transportation units with electrical components for dispensing fuel that are connected to a source of electrical power must be protected by a fire suppression device that meets the requirements of §§75.1107-3 through 75.1107-9, and §§75.1107-8 through 75.1107-16.

Q. If a diesel-powered machine is trammed in and out of the section and is never actually parked, does the final fuel require that rock dust be available?

A. No. If the machine is never actually parked, a temporary fuel storage area or a permanent underground fuel storage facility would not be required for the machine. Rock dust would therefore not need to be provided under the final rule, which requires that rock dust and/or fire extinguishers be provided at temporary fuel storage areas and permanent fuel storage facilities. However, §75.1906(h) does include certain requirements for fire suppression and fire extinguishers for diesel fuel transportations units.

Q. The final rule requires that permanent underground fuel storage facilities be ventilated with intake air that is coursed into a return air course or to be surface and that is not used to ventilate working places. Does this mean that if there are common intake entries, the air from any of those entries could not be used to ventilate the working place?

A. If some of the ventilating air is split off from the common entry before the air course is used to ventilate the fuel storage facility, the split would not be considered to have ventilated the facility and could be directed to a working place. Air that has been used to ventilate a fuel storage facility cannot be used to ventilate a working place.

Q. If there are vents in the self-closing doors on permanent underground fuel storage facilities, are the vents required to be closed as well?

A. The vents would be required to close automatically in the event of a fire.

Q. Is a metal stopping with a 2' x 2' or a 3' x3' self-closing door acceptable for isolating the permanent diesel fuel storage facility?

A. Use of such a stopping, properly installed, could be an acceptable method of achieving isolation of permanent diesel fuel storage facilities. MSHA has accepted properly installed metal stoppings as complying with the noncombustibility requirements of permanent ventilation controls in §75.301, which are essentially the same as the noncombustibility requirements for permanent fuel storage facilities.

Q. Are lights permitted in a temporary fuel storage area or in a permanent fuel storage facility? If so, are there any special requirements?

A. There is nothing in the final rule that would prohibit lights in either a temporary fuel storage area or in a permanent fuel storage facility. The electrical safety rules in part 75 would apply.

Q. Do you have any examples of what would be equivalent to a concrete floor? Is a liner covered with crushed rock to prevent damage to the liner acceptable?

A. This requirement in §75.1903(a)(7) is intended to ensure that spilled diesel fuel can be easily cleaned up and will not accumulate, creating a fire hazard. A steel floor would therefore be acceptable. A liner with crushed rock would not be acceptable, because the crushed rock would absorb a fuel spill and would prevent cleanup of a spill. Additionally, a liner could be punctured by crushed rock, enabling fuel to lead into and saturate the mine floor.

Section 75.1904 - - Underground diesel fuel tanks and safety cans

Q. Does the 3/16" thickness requirement for diesel fuel storage tanks also apply to metal storage containers?

A. The 3/16" thickness requirement applies to steel diesel fuel storage tanks. Tanks of other metal would have to be of a thickness that would provide equivalent strength.

Q. Does the prohibition against leakage in §75.1904(a)(4) apply to venting devices required in paragraph (b)(1) that are designed to "leak" when pressure in the tank exceeds 2.5 psi?

A. The venting devices required under paragraph (b)(1) are designed to vent only in an emergency situation, to relieve pressure inside the tank when it is exposed to heat, such as in the event of a mine fire. Some discharge of fuel in such an emergency situation would be expected, and would not be considered a violation under paragraph (a)(4). The prohibition against leakage under paragraph (a)(4) applies under normal (non-emergency) conditions.

Q. What is the maximum capacity of safety cans?

A. The maximum capacity for safety cans is 5 gallons.

Q. Are the safety cans required by the regulations commercially available?

A. Yes.

Q. Is the automatic closing, heat-actuated valve required on each withdrawal connection below the liquid level commercially available?

A. Yes.

Q. Would a self-closing flap in the neck of the fuel tank satisfy the requirement for a self-closing cap?

A. No. Self-closing flaps, similar to those provided on gasoline-powered pickup trucks, are not designed to prevent outflow of fuel, and would therefore not satisfy the requirement for a self-closing cap. Such flaps are not typically provided on diesel-powered equipment.

Q. Would painted fuel storage tanks be considered "protected from corrosion?"

A. Yes, painting the outside of fuel storage tanks would comply with this requirement.

Q. Do existing fuel storage tanks used underground need to be pressure tested again, or if they don't leak, would they be considered tested?

A. Section 75.1904(e) of the final rule requires that tanks and their associated components be tested for leakage at a pressure equal to the working pressure. Tanks that are already in service that meet all of the design requirements of the standard and are performing adequately (not leaking) are not required to be pressure tested.

Q. Will MSHA expect recordkeeping of the pressure testing referred to in §75.1904(e)?

A. No. The final rule contains no recordkeeping requirements for pressure testing.

Q. Do the requirements of §75.1904(a) apply to onboard fuel supply tanks of diesel-powered equipment?

A. No. Paragraph (a) applies to tanks used for storage of diesel fuel.

Q. If the section has a temporary fuel storage area, are the temporary fuel storage tanks required to be wheel-mounted?

A. Yes.

Section 75.1905 - - Dispensing of diesel fuel

Q. Do the requirements governing dispensing of diesel fuel apply to fuel dispensing taking place on the surface?

A. No.

Q. The rule prohibits the use of latch-open devices for the dispensing of diesel fuel by gravity feed or with a powered pump. Does this mean that the Wiggins Refueling System which incorporates an automatic fuel shutoff, is prohibited?

A. The use of latch-open devices is permitted only with the use of a manual pump. The Wiggins System, referred to above, does not meet the requirements of the final rule. The intent of the rule is that powered pump systems, such as the Wiggins Refueling System, require the person dispensing fuel to maintain physical control over the dispensing process at all times, to minimize, if not eliminate, accidental spills during fuel dispensing.

However, because the Wiggins System is a engineered system, it may be possible to modify the system to meet the requirements of the rule. Any such modification should be undertaken only in consultation with Wiggins.

Q. Would devices similar to the automatic cut-off nozzles used at gas pumps at commercial filling stations satisfy the requirements for a "self-closing valve" under §75.1905(b)?

A. Such a configuration would satisfy the requirements for a self-closing valve. However, the latch-open devices that are typical at gas stations would not be permitted except when used with a manual pump.

Q. Can lube tracks be running when taking on or dispensing fuel? Some lube truck must be running for there to be power to transfer diesel fuel to the lube truck.

A. Section 75.1905(d) of the final rule prohibits diesel fuel from being dispensed into the fuel tank of diesel-powered equipment while the equipment engine is running. The intent of the rule is to prohibit accidental spillage of fuel on hot surfaces that would be present if the equipment being refueled was running. In the situation described, diesel fuel is not being dispensed into the lube truck's engine fuel tank, but rather into the storage tank. The final rule therefore does not require the lube truck's engine to be shut down when taking on or dispensing fuel into its storage tank. However, when the lube truck is being refueled into its own engine fuel tank, its engine must be shut down. Similarly, the equipment being fueled by the lube truck must be shut down.

It should also be noted that §75.1916(d) prohibits the idling of mobile diesel-powered equipment, except as required in normal mining operations.

Q. Does §75.1905(c) allow for compressed gas powered motors that are used to power the pump that is dispensing the diesel fuel?

A. Yes. The final rule does not prohibit compressed gas powered motors used to power the pump that is dispensing the fuel.

Section 75.1905 – 1 - - Diesel fuel piping systems

Q. If a mine has a borehole fuel system with a 150 foot 1-inch line, and the mine operator does not plan to store fuel underground, must the mine have a tank underground in order to be able to refuel into machine fuel supply tanks, rather than fueling from the surface line directly into machine fuel supply tanks?

A. Yes. The mine must have a tank underground. This tank may be a stationary tank or a tank on a diesel fuel transportation unit. Under §75.1905(a), diesel-powered equipment in underground coal mines must be refueled only from safety cans, from tanks on diesel fuel transportation units, or from stationary tanks. Additionally, under §75.1905-1(g), diesel fuel piping systems from the surface are only to be used to transport diesel fuel directly to stationary tanks or diesel fuel transportation units in a permanent underground diesel fuel storage facility. The purpose of these restrictions is to minimize hazards associated with fuel spills. Therefore, the mine operator must also install a permanent storage facility if the borehole system is used to transport fuel underground.

Q. Does the final rule essentially force the storage of diesel fuel underground when a mine uses a surface-to-underground piping system?

A. No. The final rule does require an underground diesel fuel storage tank if a surface-to-underground piping system is used. However, fuel may be piped into a diesel fuel transportation unit, and immediately dispensed from the transportation unit into the tanks of diesel-powered equipment, thereby avoiding underground fuel storage.

Q. Doesn't the restriction on fueling all but stationary tanks or fuel transportation units from the borehole under §75.1905-1(g) increase hazards, inasmuch as the fuel has to be dispensed twice - - once to the stationary tank or transportation unit and again to the diesel equipment.

A. The intent of this provisions to prohibit fueling directly from the borehole, where there may be as much as 2,000 feet of head, into a relatively small equipment tank, with the resulting risk of accidental spillage into the underground mine environment. There is also a risk of spillage of fuel onto hot equipment surfaces.

Q. If a mine has a borehole system and does not want to build a permanent underground fuel storage facility, what options exist for the mine?

A. Diesel fuel piping systems that originate from the surface can terminate only in a permanent fuel storage facility. Likewise, these systems may only be used to transport fuel directly to a stationary tank or a diesel fuel transportation unit that is located in a permanent fuel storage facility.

Q. Are there any pressure requirements on the pipes in the borehole installation? Line pressure?

A. Section 75.1905-1(b) requires that all piping, valves, and fittings in diesel fuel piping systems used underground be: capable of withstanding working pressure and stresses; capable of withstanding 4 times the static pressures; compatible with diesel fuel; and

maintained in a manner that prevents leakage. There is no maximum value for line pressure in a borehole or piping system. The final rule requires only that the system be designed and constructed to meet the demands of the particular installation.

However, underground fuel piping systems can be very complex and may require specialized expertise for their design and installation. Mine operators should ensure that an engineering evaluation, including a fault analysis, is performed in developing a fuel piping system.

Section 75.1906 - - Transport of diesel fuel

Q. Can a diesel tank that is secured to a trailer with wheels, be carried to the section in the bucket of a scoop or in a supply car?

A. No. Section 75.1906(a) allows diesel fuel to be transported only by a diesel fuel transportation unit or in a safety can. A diesel fuel transportation unit is defined as a self-propelled or portable wheeled vehicle used to transport a diesel fuel tank. The regulations further require that the fuel tank be permanently affixed to the transportation unit whether it is a trailer, scoop bucket, or other wheeled vehicle. The tank in this example, while permanently fixed to a wheeled vehicle. The tank in this example, while permanently fixed to a wheeled trailer, is not being conveyed in a safe manner as it was designed or intended.

Q. If a fuel storage tank, such as a 300-gallon tank, is emptied inside the mine, is it permissible to leave the tank in the mine for 3 or 4 hours, until the end of the shift when the tank is brought out?

A. Section 75.1906(a) provides that diesel fuel shall be transported only by diesel fuel transportation units or in safety cans. This restriction applies whether the tank is full or empty. Consequently, the tank in question cannot stand alone but must be part of a diesel fuel transportation unit by being permanently fixed to the unit. Section 75.1906(i) provides that diesel fuel transportation units may be parked only in temporary fuel storage areas or permanent fuel storage facilities.

Q. Are there any restrictions on the number of safety cans that can be transported in a vehicle at one time?

A. Yes. Section 75.1906(b) provides that no more than one safety can shall be transported on a vehicle at any time.

Q. If 4 supply cars (trailers in a trip being towed by one conveyance) are taken into the mine, is it permissible to carry a total of 4 safety cans into the mine - - one can on each supply car?

A. No. This would be considered one vehicle, and only one safety can may be transported on it at a time. This is consistent with the purpose of the regulation, which is to minimize the use of safety cans, as well as eliminate their use as a primary means of supply and transport of diesel fuel.

Q. If each vehicle is allowed to carry only one safety can, every vehicle will carry one safety can as opposed to only a few vehicles equipped with safety cans? Doesn't this standard also discriminate against small operators who may not have the wherewithal to utilize permanent underground fuel storage facilities or fuel transportation units?

A. MSHA does not expect that the requirements of §75.1906(b) will result in the proliferation of safety cans underground. The rule does not discriminate against small operators, as the requirements for a diesel fuel transportation unit can be satisfied relatively easily and cheaply. The construction of a simple wheel-mounted tank with the requisite safety features would not be unreasonably costly.

Q. Can empty safety cans be stored in a temporary diesel fuel storage area?

A. No. Section 75.1906(b) requires that safety cans used for diesel fuel must be stored in a permanent fuel storage facility.

Q. How many safety cans are allowed underground at one time?

A. The final rule does not limit the number of safety cans allowed underground, but there are specific limitations on the transport and storage of safety cans. Only one safety can at a time may be transported on a vehicle, and safety cans may be stored underground only in a permanent underground diesel fuel storage facility.

Q. Do <u>empty</u> safety cans fall under the same restrictions as safety cans containing diesel fuel?

A. The restrictions on safety cans would apply regardless of how much (or how little) fuel the can may contain. Any amount of diesel fuel, including trace amounts in "empty" cans, provides a fuel source for a fire. Although smaller amounts of diesel fuel present a reduced fire risk, even small amounts, once ignited, could spread fire to adjacent combustible material. It is the intent of the rule to control the use of safety cans to reduce the fire risk presented by even small quantities of diesel fuel.

Q. Can safety cans be marked as containing "combustible liquid", or are they required to be marked as containing "diesel fuel"?

A. Section 75.1906(d) provides that both diesel fuel transportation unit tanks and safety cans must be conspicuously marked as containing "diesel fuel".

Q. What is meant by the term "permanently fixed" in §75.1606(f), with regard to tanks on diesel fuel transportation units.

A. The term "permanently fixed" means that the tank is bolted, welded, or attached in an equivalent manner. Lashing a tank down with a chain n the bed of a truck would not be sufficient to comply with the requirement of the final rule.

Q. Can the tank on a diesel fuel transportation unit be compartmentalized with multiple compartments, with 500 gallons or less of diesel fuel in each compartment?

A. It depends on what the total diesel fuel capacity is on the fuel transportation unit. Section 75.1906(e) provides that diesel fuel transportation units must transport no more than 500 gallons of diesel fuel at one time. Section 75.1906(f) provides that tanks on diesel fuel transportation units must have a total capacity of no greater than 500 gallons of diesel fuel. Therefore, the total diesel fuel capacity of all of the compartments of the tank together must be no greater than 500 gallons.

Q. Can an existing 1000-gallon tank on a lube unit be partitioned into two compartments, with 500 gallons for diesel fuel and 500 gallons for hydraulic fluid?

A. Yes. Section 75.1906(f) places a 500-gallon diesel fuel capacity limit on tanks on diesel fuel transportation units.

Q. If a portable storage tank trailer is hooked to and towed by a piece of self-propelled equipment, does this constitute one diesel fuel transportation unit or two units?

A. Such a conveyance would constitute one diesel fuel transportation unit. However, if the equipment used to tow the tank trailer is diesel-powered, the equipment would be considered heavy-duty equipment under §75.1908(a)(5), and is required to be equipped with an automatic fire suppression system that meets the requirements of §75.1911. If the towed trailer contains only a tank without electrical components, it is not required to be covered by the fire suppression system.

Q. Does the requirement for two fire extinguishers in §75.1906(h) apply to any vehicle on which a safety can is being transported?

A. The requirement for two fire extinguishers applies to <u>any</u> vehicle on which a safety can is being transported, regardless of what other fire protection features may be provided on the vehicle.

Q. Would a lube car be required to be stored in either an underground fuel storage area or facility?

A. Yes, if the lube car is used to transport diesel fuel. If it does, it would be considered a diesel fuel transportation unit, and, under §75.1906(i), it must be parked either in a permanent underground diesel fuel storage facility or a temporary underground diesel fuel storage area when not in use.

Q. What is the definition of "mantrip" for purposes of the restriction on carying safety cans in §75.1906(k)? Many vehicles perform double duty as supply vehicles and personnel carriers. How will MSHA distinguish them for purposes of the standard?

A. The term "mantrip" means a vehicle or elevator used to take a work crew into and out of the mine. A vehicle that is being used for double duty, i.e., that may serve sometimes as a mantrip and at other times as a supply vehicle, would be considered a mantrip for purposes of this standard only when it is performing that function. Additionally, a vehicle used, for example, by a mechanic and his helper would not be considered a mantrip. The safety can prohibition on mantrips on the final rule addresses the inherent hazards associated with the transportation of diesel fuel on personnel carriers.

Q. Would an elevator bringing a work crew into the mine be considered a "mantrip", and subject to prohibition against carrying safety cans in §75.1906(k)? Would the elevator that is carrying a work crew be considered a "vehicle" and subject to the one safety can limitation under §75.1906(b)?

A. An elevator brining a work crew into the mine would be considered a mantrip, and therefore may not be used to transport a safety can into the mine at the same time. However, the final rule does not limit the number of safety cans that can be transported into the mine on an elevator or slope car when the conveyance is not being used as a mantrip, because neither would be considered a "vehicle". However, it should be noted that once the safety cans are in the mine they may only be transported one can per vehicle or stored in a permanent fuel storage facility.

Q. Does the prohibition on carrying diesel fuel on mantrips in §75.1906(k) include an exception for the single safety can authorized in paragraph (b)?

A. No. The prohibition in paragraph (k) on carrying diesel fuel on mantrips does not permit either mantrips or conveyor belts to be used to carry a single safety can of diesel fuel.

Section 75.1907 - - Diesel-powered equipment intended for use in underground coal mines

Q. If the engine on a unit of nonpermissible diesel-powered equipment is sent out for rebuilding, what requirements apply?

A. After November 25, 1999, all engines on nonpermissible diesel-powered equipment must be approved under subpart E of part 7. Therefore, any engine used in an underground coal mine on or after that date must be an approved engine. If an approved engine is sent for rebuilding or repair it must be rebuilt or repaired to an approved condition.

Q. Will existing part 32 engines meet the part 7, subpart E, category B requirements by November 25, 1999?

A. Although most if not all engines that have been approved under part 32 would satisfy the gaseous emission requirements of part 7, the engine manufacturer must obtain formal MSHA approval under subpart E of Part 7 for the engine by November 25, 1999. If the engine manufacturer does not obtain approval by the effective date of that requirement, the equipment cannot continue to be operated in an underground coal mine. The equipment engines must be replaced with engines that have been approved under subpart E of part 7.

Q. Who is responsible for determining the particulate index and the approval plate air quantity under §75.19078(b)(4) for existing permissible diesel-powered equipment?

A. MSHA has worked with NIOSH to arrange tests by the Center for Diesel Research in Minneapolis, Minnesota, to determine revised ventilating air quantities and particulate index for the four most common engines inn part 36 equipment currently in use in underground coal mines. MSHA has already made information on 3 of these engines available to the mining community through Program Information Bulletins and postings on MSHA's Internet Home Page. The test results for the remaining engine will be released as soon as it is available.

Q. By November 25, 1999, nonpermissible equipment will have many of the same features as permissible equipment. Can nonpermissible equipment then be taken into face areas?

A. No. Although the final rule requires a number of safety features similar to those required permissible equipment to be provided on nonpermissible equipment, the fact remains that this equipment is not permissible. The safety features required on nonpermissible equipment, although similar in some cases to the features required on permissible equipment, do not provide the explosion-proof protections which are key for permissible equipment.

Q. Will permissible equipment be required to have automatic fire suppression systems if they are used in return air courses?

A. No. Permissible diesel-powered equipment may be provided with either a manual or an automatic fire suppression system, regardless of where it is operated in the mine. The one exception is set forth in §75.380, which pertains to equipment operated in the primary escapeway.

Section 75.1908 - - Nonpermissible diesel-powered equipment - - categories

Q. What is the definition of "longwall components" for purposed of §75.1908(a)(3)?

A. The term "longwall components" includes large, heavy, equipment, such as shearers, shields, and pan lines. It would not include such small items as cables and lights, even though they are used on a longwall system.

Q. Is there a weight limit for longwall components?

A. No.

Q. Is a vehicle used on the belt line to clean up spilled coal considered heavy-duty or light-duty equipment?

A. The equipment would be considered heavy-duty because it is used to move coal.

Q. Would a vehicle used to haul gravel be considered heavy-duty?

A. Yes. The equipment would be considered heavy-duty because it is used to move rock.

Q. Would a vehicle pulling a trailer containing concrete blocks be considered light-duty or heavy-duty?

A. The vehicle would be considered to be light-duty equipment because it is used to haul supplies rather than rock or coal.

Q. Would a road grader be considered heavy-duty equipment?

A. Yes. A road grader would be considered heavy-duty equipment because it does not move rock or coal.

Q. Would a tug used to move supplies be classified as heavy-duty equipment?

A. No. That equipment would be considered light-duty equipment because it does not move rock or coal.

A. What does the term "lube unit" mean as used in §§75.1908(a)(4) and (5)? Is a lube unit something that is used to carry diesel fuel?

A. A lube unit is a conveyance that carries any combination of one or more of the following: grease; hydraulic fluid; gear oil; diesel fuel; or brake fluid.

Q. Would a lube unit be considered heavy-duty equipment, even if it does not carry diesel fuel?

A. Yes. A lube unit that does not transport diesel fuel would still be considered heavy-duty equipment. Sections 75.1908(a)(4) and (5) specifically include both self-propelled and portable diesel-powered lube units within the definition of heavy-duty equipment.

Q. When a permissible rock duster is operating and the operator goes through either a door, a curtain, or a stopping, would the rock duster be considered attended or unattended?

A. Section 75.1908 (c)(1) provides that "any machine or device operated by a miner" is considered attended. This requires a miner to be at the controls of the machine and within close proximity of the diesel engine. Examples would be a scoop operator or a roof bolter operator. Paragraph (c) (2) provides that equipment is attended if it is in the direct line of sight of a job site located within 500 feet of the machine, and that job site is occupied by a miner. This is intended to allow the operation of certain portable equipment, such as welders and sealant machines.

MSHA does not intend to prohibit, for example, a miner at a job site which is within 500 feet and in the line of sight of the welding machine from performing the welding operation when his view of the welder is obstructed for short periods of time. Conversely, this requirement is not intended to allow a miner to be at the end of a rock dust hose at a job site that is out of sight of the rock dusting machine. The purpose of this requirement is to ensure that a person will be in a position to check the operation of the diesel machine and intervene if for any reason the machine should start to present a hazard.

Q. Would equipment used for multiple uses be considered heavy-duty at all times or only while performing heavy-duty tasks? Example - - a vehicle used to pull a trailer full of cinder blocks would be light-duty; however, the same vehicle pulling a fuel storage trailer would be heavy-duty?

A. Section 75.1908 distinguishes between light-duty and heavy-duty equipment based on the work the equipment is actually performing, not based on the work it is capable of performing. Equipment that may have the capability of performing work under heavy load may in fact not be considered a heavy-duty machine under the regulations because it is used to perform only light-duty work. However, a machine that performs heavy-duty functions, even if only intermittently, must comply with all of the requirements for heavy-duty equipment. Once installed, the equipment features must be properly maintained.

The requirements are almost the same for both categories of equipment. The only difference is that heavy-duty equipment must be provided with an automatic fire suppression system, a supplemental braking system, and undergo a weekly check of undiluted exhaust emissions.

Q. A diesel-powered locomotive is used for heavy-duty work only for limited and discrete periods several times a year, i.e., to move shields during longwall moves. During the rest of the year the equipment is used only for light-duty work, i.e., to move supplies. The locomotive will be provided with all of the equipment features required for heavy-duty equipment under §75.1909. Is the equipment required to undergo the undiluted exhaust emissions test required by §75.1914(g) every week, regardless of whether the equipment is being used for heavy-duty work in that week.

A. The undiluted exhaust emissions tests required under §75.1914(g) would only be required in those weeks when the equipment is used to perform heavy-duty work. However, MSHA recommends that the emission test be conducted in the week immediately preceding any week that the equipment will be used to perform heavy-duty work, to eliminate any questions as to whether the requirement has been satisfied.

Additionally, it should be noted that the intent of this requirement is to monitor engine performance to determine when engine maintenance is necessary. Conducting this test intermittently or only a few times a year may not provide adequate data for this evaluation, particularly since the records of these tests are not required to be maintained for longer than a year. Mine operators should take these factors into account in developing their testing and evaluation procedures.

Q. If diesel-powered emergency vehicles comply with the requirements of §§75.1909 and 75.1910, must they still be included in the firefighting and evacuation plan?

A. No. The emergency vehicles are required to be included in the firefighting and evacuation plan only if the mine operator is claiming an exemption for that equipment from compliance with the requirements of §§ 75.1909 and 75.1910.

Q. If a piece of nonpermissible diesel-powered equipment has an onboard hydraulic system capable of operating a small rock/coal drill used for spot roof-bolting in outby areas, does this mean that it is heavy-duty equipment? (i.e., hydraulic PTO's on converted 320 tractors used to pull supplies).

A. If the equipment is used to perform drilling, it will be considered heavy-duty equipment.

Q. Does the use of drags on equipment make the equipment heavy-duty?

A. Light-duty equipment equipped with drags, which is performing its normal function, would not be considered heavy-duty equipment. However, equipment that pulls drags in order to function as a road grader would be considered heavy-duty equipment.

Section 75.1909 - - Nonpermissible diesel-powered equipment; design and performance requirements

Q. Section 75.1909(a)(2) requires that fire extinguishers be within easy reach of the equipment operator. Would this allow them to be mounted outside of the cab?

A. The rule does not require that the extinguisher be located inside the equipment cab, only that the extinguisher is within easy reach of the operator and protected from damage.

Q. Section 75.1909(a)(2) requires that nonpermissible equipment be equipped with a portable fire extinguisher, which must be "protected from damage". To what degree does a fire extinguisher have to be protected? Will a guard on the gauge and control handle suffice, given that the extinguisher tank itself is substantially constructed and does not need additional protection?

A. The intent of this standard is to ensure that a fire extinguisher is readily available and functional in the event of a fire on diesel-powered equipment. Compliance with this standard could mean that the extinguisher is either located in an area of the operator's cab where it is out of the way of damage, or that the extinguisher itself is guarded to protect it from damage during normal operation of the equipment. Substantial construction of the extinguisher tank alone does not meet the intent of this requirement.

Q. Are there any requirements for on-board vehicle fuel tank construction? There have been occasions at our mine where equipment fuel tanks leak on the equipment engine.

A. This section of the final rule addresses that hazard. Section 75.1909(a)(3) includes fuel system requirements for diesel-powered equipment. Leaking equipment fuel tanks would be in violation of paragraph (a)(3)(i), which required that the fuel tank and fuel lines not leak. Paragraph (a)(3)(v) further requires that the fuel tank, filler, and vent be located so that leaks or spillage will not contact hot surfaces.

Q. What is considered a "hot surface" under §75.1909(a)(3)(viii), which requires that primary fuel lines must be located so that fuel line leaks do not contact hot surfaces? Is a cold surface anything under 302° F?

A. No specific temperature limit defines what constitutes a hot surface. Hot surfaces would include surface of the engine's exhaust system, but may include other machine surfaces that are heated through machine operation. The intent of this requirement is to prevent leaking fuel from coming into contact with any surface that is hot enough to ignite diesel fuel. The autoignition temperature of diesel fuel is generally above 400°F.

Q. Would the fuel piping systems on diesel-powered highway vehicles such as Isuzu, Dodge, General Motors, or Ford products, meet the requirements for fuel line piping under the final rule?

A. Most of the fuel systems on commercially-available diesel-powered vehicles substantially comply with the requirements of the final rule, and either need no modifications or can be brought into full compliance with minor modifications.

Q. To what extent must fuel lines and electrical wiring be separated to comply with §75.1909(a)(3)(ix)?

A. There are several different methods that can be used to comply with this requirement. These include physical separation by distance of the fuel lines from the electrical wiring. Other methods include placing the wires or fuel lines into a conduit, or bundling the electrical wires above the fuel lines, to ensure that no fuel will drip on the wires.

Q. If all electric wires are located in conduits, would that constitute separation from fuel lines required under §75.1909(a)(3)(ix)?

A. Yes, so long as the conduit prevents the leaking fuel from coming into contact with electric wires.

Q. With regard to the manual shutoff valve requirement in §75.1909(a)(3)(x), can the shutoff valve be located in utility vehicles (Ford, Isuzu, etc.)?

A. Yes. The accessibility to the shutoff valve is an important a consideration in determining the location of the valve as is the proximity of the valve to the tank.

Q. Can a solenoid-operated fuel shut-off valve tied into the vehicle's ignition switch replace the manual shut-off valve required by §75.1909(a)(3)(x)?

A. No.

Q. Are cylinder head temperature sensors required on water-cooled engines?

A. No. Section 75.1909(a)(4) requires sensors to monitor the cylinder head temperature only on air-cooled engines.

Q. What means are available to comply with §75.1909(a)(10), which requires that a means be provided to prevent the spray from ruptured hydraulic or lubrication oil lines from being ignited by contact with engine exhaust system component surfaces.

A. The requirements of this paragraph are performance-oriented, and are intended not only to allow flexibility in compliance but also to accommodate new technology developed in the future. One method of achieving compliance with this requirement is through the use of water-cooled exhaust components. A safety component system certified under part 36 or a power package approved under subpart F of part 7 also satisfies the requirements of this paragraph.

Non-absorbent insulating materials are also available for use on mining equipment to reduce the surface temperature of diesel exhaust system components. Such materials, which were first developed for diesel-powered military vehicles, are impervious to hydraulic fluid, lubricating fluids, and diesel fuel, and have been successfully used on mining equipment in the United States and Canada. Use of these materials can reduce surface temperatures of exhaust components to less than 300°F, and may also be used to prevent contact of hydraulic fluid and lubricating oil with hot surfaces.

The use of shielding or partitions to isolate hydraulic components from the engine would also satisfy the requirement of this paragraph, preventing the fluid from contacting the engine in the event of a leak.

Q. Section 75.1909(a)(10) requires that a means be provided to prevent spray from ruptured hydraulic or lubricating oil lines from being ignited by contact with engine exhaust system component surfaces. What are considered engine exhaust system component surfaces?

A. Engine exhaust system component surfaces would include any component that exhaust gas touches, including but not limited to heads, turbochargers, manifolds, mufflers, exhaust pipes, and catalytic converters.

Q. How many braking systems are required for nonpermissible equipment?

A. The answer to this question depends on whether the equipment is self-propelled, and also whether the equipment is heavy-duty or light-duty. There is no requirement for a braking system for nonpermissible diesel-powered equipment that is not self-propelled. Sections 75.1909(b)(7) and (b)(8) require that all nonpermissible self-propelled equipment be provided with service brakes. Section 75.1909(c) requires that nonpermissible self-propelled heavy-duty equipment, except rail-mounted equipment, be provided with a supplemental braking system that meets specific requirements. Section 75.1909(d) requires that self-propelled nonpermissible light-duty equipment, except rail-mounted equipment, be provided with a parking brake that meets specific requirements.

Q. Aren't accumulators built into machines to assist in steering? Won't compliance with the provisions of §75.1909(b)(1) - - which requires a means to ensure that no stored hydraulic energy that will cause machine articulation is available after the engine is shut down - - result in a hazard due to loss of steering ability? Will a slow bleed-off of stored hydraulic energy be acceptable?

A. The standard does not require an immediate loss of hydraulic pressure. The intent of this requirement is that the pressure drain off over a short period of time, to keep the machine from having steering cylinders activated when the machine is shut down. This feature is already provided on many permissible diesel-powered machines.

Q. Section 75.1909(b)(6) requires service brakes that are designed such that failure of any single component, except the brake actuation pedal or other similar actuation device, must not result in a complete loss of service braking capability. Does a service brake that operates off a disc welded to the input pinion of an axle comply with this requirement?

A. Yes, if there is a separate disk for both axles.

Q. Section 75.1909(b)(6) requires that self-propelled nonpermissible equipment be provided with service brakes that act on each wheel of the vehicle. A small diesel 3-wheel carrier is being designed to use a single mechanical disk brake on the rear driveline (which in turn acts on both rear wheels) and a single mechanical brake on the sole front wheel. Would this meet the requirements of paragraph (b)(6)?

A. Yes, provided that all of the regulatory requirements are met. The regulations require that the braking system safely bring the fully loaded vehicle to a complete stop on the maximum grade on which it is operated. Additionally, the brake system design must be such that failure of any single component, except the brake actuation pedal or other similar actuation device, does not result in a complete loss of service braking capability.

Q. A six-wheel vehicle similar to a highway grader has brakes on the rear four wheels. The vehicle is equipped with an independent left to right side service braking system and a spring-applied, air-released secondary brake located on the transmission output. Supplying front brakes would be difficult. What does §75.1909(b)(6) require for this type of brake design?

A. The standard requires that service brakes be provided that act on all six wheels. In the example given, the front wheels would have to be equipped with service brakes.

Q. Section 75.1909(b)(7) requires that service brakes must safely bring a fully loaded vehicle to a complete stop. Is "safely" defined as a stopping length, a g factor, or as a length of time from actuation?

A. While this standard does not specify stopping times or distances, whether or not the service brakes stop the vehicle safely depends upon the operating conditions. Compliance is highly site-dependent because of the variations in equipment use as well as mine grades. The mine operator is responsible for ensuring that the equipment had adequate braking and holding capabilities based on the loads the equipment hauls and the grades on which the equipment operates.

Q. How do the requirements for service brakes on self-propelled, nonpermissible diesel-powered equipment apply to equipment that utilizes hydrostatic wheel motors as the means of power transmission to the wheels?

A. For purposes of answering this question, it is assumed that the hydrostatic wheel motors are used to provide a substantial portion, if not all, of the equipment's service braking capability.

Section 75.1909(b)(7) requires that service brakes safely bring the fully loaded vehicle to a complete stop on the maximum grade on which the equipment is operated. The preamble to the final rule describes the desired stopping performance, and further states that the mine operator is responsible for ensuring that equipment was adequate grade-holding capacity is used at a particular location.

The intent of the final rule is that the service brake stop and hold the equipment in place, whether the braking capability is developed by means of hydrostatic motors, by a separate service brake, or by a combination of the two. Where hydrostatic wheel motors provide the service braking capability, it is not acceptable to expect the machine operator to feather the tram pedals in order to hold the machine stationary.

Section 75.1909(b)(8) prohibits the installation of devices that trap a column of fluid to hold the brakes in the applied position. The preamble language clarifies that this prohibition is not intended to apply to hydrostatic drive wheel motors that are designed and maintained to function as service brakes, if the motors meet the performance requirements of the rule, i.e.,

both stopping and holding the equipment stationary. It may be necessary to supplement the hydrostatic wheel motor braking effect with a separate conventional service brake when the equipment will be used on slopes, to move heavy loads, or if the design of the hydrostatic drive system results in an unacceptable stopping distance or vehicle movement after the equipment is stopped.

Q. Are there any service and supplemental brake requirements for crawler-mounted equipment?

A. The requirements in §§75.1909(b)(7) and (b)(8) of this section of the final rule would apply to nonpermissible crawler-mounted equipment, as well as some of the requirements in paragraphs (c), (d), and (e), depending on whether the equipment in question is heavy-duty or light-duty.

Q. With regard to the requirements of §§75.1909(c) and (d), aren't supplemental and park brake systems one and the same? Are they two separate systems?

A. The final rule requires that parking brakes be provided on self-propelled nonpermissible light-duty equipment, and the brakes must meet the requirements of paragraphs (d). Self-propelled nonpermissible heavy-duty equipment must be provided with a supplemental braking system that meet the requirements in paragraphs (c)(1) through (c)(5). The supplemental systems required for heavy-duty equipment provide the same parking brake capabilities as on light-duty equipment, and additional braking functions that are required on similar electric-powered equipment under §75.523-3.

Q. Section 75.1909(c)(1) requires a supplemental braking system for heavy-duty equipment that engages automatically within 5 seconds of the shutdown of the engine. Is it MSHA's intent that the brakes engage within 5 seconds or that the vehicle come to a stop within 5 seconds?

A. MSHA intends that the brakes engage within 5 seconds of the shutdown of the engine, consistent with the language of the standard. This interpretation is the same as that for a similar requirement in § 75.523-3, which apply to brakes on electrical equipment.

Q. Section 75.1909(c)(5) requires that the supplemental braking system for heavy-duty equipment have a means in the equipment operator's compartment to release the brakes manually. Will a hand pump inside the operator's cab meet the requirements of the standard?

A. Yes.

Q. Can releasing the pressure from a spring-applied, hydraulically release brake slowly through a reverse modulating valve be used for service braking?

A. Whatever system that is used for service braking must meet the requirements in §§ 75.1909(c)(7), which apply to those braking systems.

Q. Does §75.1909(e) require the park brake to be automatically applied when the equipment operator is not at the controls?

A. No, the park brake can be applied with a manual control.

Q. Section 75.1909(g) requires that any nonpermissible equipment that discharges its exhaust directly into a return air course be provided with a power package approved under subpart F of part 7. Does this requirement apply to diesel-powered air compressors?

A. This requirement applies to all diesel-powered air compressors that discharge their exhaust directly into a return air course. The basis for this requirement is the possibility that the return air course may contain high levels of methane, which could be drawn into the machine's exhaust system as it cools down after engine shutdown. This creates the potential for ignition of the methane by the hot surfaces of the diesel engine.

Q. If we choose to put an automatic rather than a manual fire suppression system on a piece of light-duty equipment (which is required to have only a manual system) does the system have to meet all the requirements of an automatic system, which are more extensive than for a manual system?

A. Section 75.1909(I) provides that self-propelled nonpermissible light-duty equipment must be equipped with an automatic or manual fire suppression system meeting the requirements of § 75.1911. If an automatic system is provided on light-duty equipment, it must still meet all the requirements for automatic systems under § 75.1911.

Q. Section 75.1909(j)(1) requires that nonpermissible equipment that is not self-propelled be provided with a means to prevent inadvertent movement of the equipment when parked. Would the use of wheel blocks or chocks be an acceptable method of complying with this requirement?

A. Yes.

Section 75.1910 – Nonpermissible diesel-powered equipment; electrical system design and performance requirements

Q. Section 75.1910(b) provides that each electric conductor from the battery to the starting motor must be protected against short circuit by fuses or other circuit-interrupting devices placed as near as practicable to the battery terminals. Does this require that short circuit protection be provided on the positive lead? Does "each electrical conductor from the battery" also mean that the ground conductor has to have a short circuit protective device?

A. Short circuit protective devices are required to be provided for both positive and negative conductors in ungrounded direct-current electrical systems. In systems where one polarity is grounded, short circuit protection is required only in the ungrounded phase, as near as practicable to the battery terminal. Redundant protection may be provided, however, if desired.

Q. Section 75.1910(d) requires that the electrical system be equipped with a circuit-interrupting device by means of which all power conductors can be deenergized. Will a manually operated blade (knife) switch suffice?

A. Yes. Any circuit interrupting device such as a knife switch, rotary disconnect switch, manual reset circuit breaker, or contractor relay may suffice in this application provided: 1) it is placed in each ungrounded (power) conductor; 2) located as close as practicable to the battery terminals; 3) properly selected and installed in a circuit, in order that it may be operated within its electrical ratings without damage; 4) not automatically reset after being actuate; and 5) be designed or otherwise mounted in a manner which precludes its closing by force of gravity.

Q. Can one protective device be used under § 75.1910(e) to protect a starter motor and a D.C. hydraulic pump motor when they are rated approximately the same, if the lower rating is used to size the short circuit protection device? They will not be used simultaneously at all times and do not perform the same duty.

A. Yes, that would be permitted. One overcurrent device may be used to protect one or more motors that do not operate simultaneously, provided it is capable of deenergizing the motor circuits if any one of the motors experiences an overcurrent condition, such as arcing and overheating.

Q. Does permissible diesel-powered equipment approved under part 36 meet the NEC provisions referred to in § 75.1910(f)?

A. Section 75.1910 specifically applies to nonpermissible equipment, and therefore permissible vehicles currently approved under part 36 are not required to meet the provisions of paragraph (f). electric conductors on part 36-approved equipment are required to have adequate current-carrying capacity for the loads involved, and are not necessarily constrained by the ampacity tables provided in the National Electric Code, 1968 (which are incorporated indirectly in paragraph (f) through reference to existing § 75.513-1) Part 36 approvals that have been issued since March 16, 1982, have electrical system conductors

with current-carrying capacities consistent with the Insulated Cable Engineers Association standards.

Equipment originally approved under part 36 that has its status converted from permissible to nonpermissible (necessitating compliance with § 75.1910) must comply with paragraph (f). The equipment's conductor sizes would be considered in compliance with § 75.513-1 in accordance with MSHA policy addressing the application of that section with respect to the ampacity ratings of power cables manufactured according to ICEA standards.

Electrical systems and components on diesel-powered vehicles approved under part 36 prior to March 16, 1982, were restricted to self-contained battery-powered headlight units approved under part 20. Because these units are self-contained without any external wiring connections, these systems would not fall within the scope of §75.1910.

Q. Section 75.1910(I) requires that cables enter metal frames of motors, splice boxes, and electric components only through proper fittings. Is wrapping insulated wires with rubber conduit where the wires pass through metal frames, holes, etc., sufficient for compliance with this requirement?

A. Yes. Paragraph (I) is intended to reduce the possibility of chafing of cable or wire insulation, which would expose or accidentally ground the conductors at points where they pass through compartment walls or metal frames of equipment. Existing MSHA policy allows insulated electric wires passing through walls of metal enclosures to be protected against damage with insulated bushings or suitable insulating material used in conjunction with a fitting or clamp that will prevent movement of the conductor in the opening. Wrapping insulated wires with rubber conduit in this application would also be considered sufficient to comply with the requirement of paragraph (I). The insulating material should be resistant to deterioration from engine heat and oil.

Q. Do the requirements of § 75.1910(j), which address protection and insulation of batteries, apply to 12-volt batteries on light-duty equipment?

A. Yes. Twelve-volt batteries on light-duty equipment would be subject to the provisions in paragraph (j) if they are connected to the equipment's starting and charging system, because it has been documented that this application presents an increased risk of fire. Batteries associated with electrical systems are components independent of the equipment's starting and charging circuits are not included within the scope of the requirements of this section because they do not present the same risk of fire. Storage batteries on the special category of equipment under § 75.1908(d) also do not fall within the scope of this requirement.

Section 75.1911 – Fire suppression systems for diesel-powered equipment fuel transportation Units

Q. Is a field modification necessary to change the location of the fire suppression system on a unit of permissible diesel-powered equipment?

A. The answer to this questions depends on the fire suppression details in the approval drawings that were submitted to MSHA as part of the application for equipment approval. You should either contact the manufacturer or MSHA's Approval and Certification Center.

Q. If the fire suppression system has been installed by the equipment manufacturer, is a field modification for equipment approved under part 36 necessary? If the fire suppression system is installed by the fire suppression system distributor/manufacturer do we need a field modification?

A. If the fire suppression system has been installed by the equipment manufacturer in accordance with the approval, a field modification will not be necessary. However, if the fire suppression system has been installed by the system's distributor or manufacturer, a field modification may be necessary. You should contact MSHA's Approval and Certification Center for further information on the specific equipment and fire suppression system.

Q. Is a fire suppression system required on rail-mounted fuel cars (towed vehicle) with no electrical system?

A. Rail-mounted fuel cars that have no electrical components would not be required to be equipped with a fire suppression system. However, § 75.1906(g) provides that non-self-propelled diesel fuel transportation units with electrical components for dispensing fuel that are connected to a source of electrical power must be protected by a fire suppression device that meets the requirements of §§ 75.1107-3 through 75.1107-6 and §§75.1107-8 through 75.1107-16. Additionally, if a diesel-powered vehicle is towing the fuel cars, it would be considered heavy-duty equipment and would be required under § 75.1911(h) to have an automatic fire suppression system.

Q. Section 75.1911(a)(4) requires discharge nozzles on fire suppression systems to be protected against the entrance of foreign materials such as mud, coal dust, or rock dust. Can nozzles be "protected" by their location and/or orientation?

A. This is a performance-oriented requirement, and in some cases the location or orientation of nozzles will provide the necessary degree of protection, in some cases not. This may also depend on the specific conditions in the system's listing or approval.

Q. Does the final rule allow permissible equipment to be provided with either a manual or an automatic fire suppression system?

A. Yes. Under §75.1907(b)(2), diesel-powered equipment approved under part 36 must have an automatic or manual fire suppression system that meets the requirements of § 75.1911.

Q. Section 75.1911(b) appears to require, for either a manual or an automatic fire suppression system, nozzle coverage for delivery of dry chemical to the engine, including the starter, transmission, hydraulic pumps and tanks, exposed brake units, air compressors, and battery areas on diesel-powered equipment, and electric panels or controls used on fuel transportation units and other areas as necessary. For a manual system, you do not need to have detectors, but for an automatic system you do, and the detectors must protect the areas listed above for nozzle coverage. Is this a correct interpretation of the regulation?

A. Yes. The coverage areas are the same for manual and automatic systems; fire detection is also required for the coverage areas of automatic systems. Specific coverage of the nozzles and detectors will also depend to a large degree on the requirements of the listing or approval for the fire suppression system.

Q. Are both manual and automatic fire suppression systems required to provide for automatic engine shutdown?

A. Yes. Section 75.1911(d) applies the requirement for automatic engine shutdown to both manual and automatic systems.

Q. Does installation of the automatic engine shutdown feature required under § 75.1911(d) require a field modification on permissible equipment?

A. The answer to this question depends on the specifics of the machine approval. If the design is such that a field modification or extension of approval is required, mine operators should check with the equipment manufacturers to determine whether they have applied for an extension of approval to put engine shutdowns into their safety systems. If this is the case, a field modification would not be necessary.

Q. If we choose to put an automatic rather than a manual fire suppression system on a piece of light-duty equipment (which is required to have only a manual system) does the system have to meet all the requirements of an automatic system, which are more extensive than for a manual system?

A. Section 75.1909(I) provides that self-propelled nonpermissible light-duty equipment must be equipped with an automatic or manual fire suppression system meeting the requirements of § 75.1911. If an automatic system is provided on light-duty equipment, it must still meet all the requirements for automatic systems under § 75.1911.

Q. Would a standard automotive disc brake rotor be considered an exposed brake part and therefore require fire suppression coverage?

A. As discussed in the answer to the question above, the areas covered by a specific fire suppression system will depend to a large degree on the requirements of the system's listing or approval. Standard automotive disc brake rotors are typically covered. Exposed spring-applied brakes must be covered in all cases, because they are typically the source of frictional fires.

Q. If diesel-powered equipment is operating in the intake escapeway, would the final rule require that it be equipped with a manual or an automatic fire suppression system?

A. Under the standards governing underground coal mine ventilation, either an automatic or manual system would be acceptable for most diesel-powered equipment. However, if the diesel-powered equipment is a dedicated personnel carrier, § 75.380 (f)(5) requires that the equipment be provided with an automatic fire suppression system if it is being operated in the primary escapeway.

Q. Section 75.1911(e) provides that the system be operable by at least two manual actuators, with one actuator located on each side of the equipment. On small light-duty equipment (e.g., an Isuzu pickup truck) is it acceptable to have only one actuator if it is located in the center of the operator's compartment and is accessible from either side of the vehicle?

A. This would not be acceptable. The standard requires two actuators.

Q. Section 75.1911(f) requires that the fire suppression system remain operative in the event of engine shutdown, equipment electrical system failure, or failure of any other equipment system. Does this requirement prevent the use of the vehicle battery as a power source for certain kinds of fire suppression systems, where the fire suppression system would not actuate automatically if the battery fails?

A. The requirement in paragraph (f) would prevent the use of such a system.

Section 75.1912 – Fire suppression systems for permanent underground fuel storage facilities

Q. Section 75.1912(a) requires that fire suppression systems for permanent underground diesel fuel storage facilities be listed or approved by a nationally recognized independent testing laboratory and appropriate for installation at a permanent underground diesel fuel storage facility. Has MSHA identified any such systems?

A. Certain manufacturers of fire suppression systems with Underwriters Laboratory (UL) or Factory Mutual Research Corporation (FM) listings or approvals have indicated that their dry chemical or foam/water fire suppression systems can be engineered to meet the requirements of § 75.1912. Whether or not a system meets all of those requirements will depend on how the system is engineered and installed at the particular location.

These companies and systems types are:

AFEX, Division of Bonaventure Group, Inc. 5808 Lease Drive Raleigh, NC 27613 (919) 781-6610	Dry Chemical
Alison Control, Inc. 35 Daniel Rd. Fairfield, NJ 07006 (201) 575-7100	Foam/Water
Amerex Corp. P.O. Box 81 Trussville, AL 35173-0081 (205) 655-3271	Dry Chemical
Angus Fire Armor Corp. Kennebec Rd. & Broad St. Angier, NC 27501	Foam/Water
Ansul Fire Protection, Inc. One Station Street Marinette, WI 54143 (715) 735-7411	Dry Chemical or Foam/Water
National Foam System, Inc. 150 Gordon Cr. Box 270 Exton, PA 19341 (610) 594-4035	Foam/Water

Pem All Fire Extinguisher Corp. Division of Pen Systems 39A Myrtle St. Cranford, NJ 07016 (908) 276-0211	Dry Chemical
Pyro Chem, Inc. 301 Division St. Boonton, NJ 07005 (800) 526-1079	Dry Chemical
The 3M Company/Viking Fire Protection 3M Center St. Paul, MN 55144 (612) 733-0444	Foam/Water
Share Corp. P.O. Box 23053 Milwaukee, WI 53223 (414) 355-4000	Foam/Water

Section 75.1913 – Starting aids

Q. Does the final rule prohibit starting aids from being brought inby the last open crosscut?

A. Yes. Section 75.1913(c)(1) provides that volatile fuel starting aids shall not be taken into or used in areas where permissible equipment is required.

Q. Can starting aids be used in outby areas of the mine?

A. Starting aids can be used in outby areas in accordance with any recommendations provided by the starting aid manufacturer, the engine manufacturer, or the machine manufacturer. Manufacturers of starting aids typically provide instructions for use of their product. Most engine manufactures provide recommendations for starting aid use or specify that starting aids not be used at all with their engine. A prohibition on the use of starting aids by either the engine or the machine manufacturer would preclude their use with that particular engine or machine. Personnel who use starting aids must first be task trained.

Q. What is the rationale for prohibiting other volatiles in the same metal enclosure as starting aids?

A. This prohibition addresses the concern that containers of volatile fuel starting aids could be damaged through contact with other items, resulting in the release of the starting aid and the creation of a potentially hazardous situation.

Section 75.1914 – Maintenance of diesel-powered equipment

Q. What is meant by "approved" in § 75.1914(a)?

A. The term "approved" used in the phrase "maintained in approved condition" means that the features of the engine, the power package, or the machine that were evaluated during the approval are maintained consistent with the approval specifications.

Q. If equipment is not immediately removed from service, an two citations be issued, one for a violation of § 75.1914(a), and one for a violation of § 75.1725(a)?

A. Only one citation would be issued, in most if not all cases for a violation of § 75.1914(a).

Q. Does a permissible machine have to be maintained in permissible condition if it is never used in an area where permissible equipment is required? In the past, MSHA would allow mine operators to remove the machine approval plate and the operator would no longer be required to maintain the machine in permissible condition.

A. The final rule requires permissible diesel-powered equipment to be maintained in approved condition, including permissible equipment that is operated in outby areas. There are several reasons for this requirement. Many types of approved diesel equipment are extremely mobile, moving easily from areas of the mine where permissible equipment is required to areas where it is not, and there is nothing to distinguish a piece of diesel-powered equipment that has been maintained in permissible condition from one that has. Additionally, temperature sensors and other safety system components on diesel-powered equipment can be permanently damaged by exposure to high temperature exhaust gas when the equipment is not maintained in approved condition and a safety system is bypassed.

However, if the approval plate is removed from a machine, the machine could be converted to nonpermissible equipment. In converting the machine, those fire - and explosion-proof features that will no longer be maintained in permissible condition must be removed. This should be done in consultation with the equipment manufacturer to ensure that other interconnected machine safety features are not adversely affected and that a maintenance manual tailored to the converted equipment is made available. Any permissible components that are not removed must be maintained in accordance with the manufacturer's maintenance manual. Note that as of November 25, 1999, an engine approved under subpart E of part 7 must be used in nonpermissible equipment.

Q. Diesel-powered equipment is required to be maintained in approved and safe condition or removed from service. Does this apply only to those items that are subject to approval and that affect safety?

A. All machine features that are either approved or that affect safety must be maintained.

Q. Is it mandatory that an engine that is rebuilt run on a dynamometer to seat the ring before the engine goes underground?

A. The rule contains no specific provisions that address that issue. The rule simply requires that diesel-powered equipment be maintained in approved condition.

Q. Does electrical work on diesel-powered equipment have to be done by a person qualified under § 75.153?

A. Work on electrical circuits and components associated with or connected to the storage batteries and integral charging systems, covered by § 75.1910, must be performed by a person who has been qualified under § 75.1915. Work on electrical systems on the machine that are not covered by § 75.1910 must be performed in accordance with the electrical standards in subpart F of part 75.

Q. What constitutes a "qualified person"?

A. For purposes of § 75.1914, a qualified person is someone who has successfully completed a training and qualification program that meets the requirement of § 75.1915.

Q. Does a person who performs repairs and maintenance only on nonpermissible light-duty equipment have to be qualified under § 75.1915?

A. Yes. The rule requires a person to be qualified under § 75.1915 if he or she performs maintenance and repairs of approved features and those features required by §§ 75.1909 and 75.1910. As of November 25, 1999, nonpermissible light-duty equipment will be required to have an engine approved under subpart E of part 7, and is also required to be provided with a number of features under §§ 75.1909 and 75.1910.

Q. Is the equipment operator who checks fluid levels and performs basic tasks such as changing the air filter, changing the oil, greasing, etc., required to complete some kind of training course?

A. The person who performs those tasks is not required to be qualified under § 75.1915. However, the individual must be task trained.

Q. Section 75.1914(c) requires that the water scrubber system be drained and flushed at least once each shift that the equipment is operated. What is MSHA's policy if the manufacturer's recommended practices allow for draining and flushing the water scrubber system less often than at least once a shift?

A. The requirement of paragraph (c) must be complied with, regardless of whether a manufacturer recommends less frequent flushing than once a shift. Routine cleaning of scrubbers, which cool equipment exhaust gases and act as flame arresters, is essential to prevent a buildup of solid exhaust particles and sludge in the scrubber, which can hamper its effectiveness. Cleaning the scrubber more frequently than the manufacturer recommends should have no adverse effects on the equipment.

Q. When a diesel-powered scoop has been used to load rock, must the scrubber be cleaned and flushed after each shift?

A. Section 75.1914(c) requires that the scrubber be drained and flushed every shift on all diesel-powered equipment, regardless of the function the equipment performs.

Q. Section 75.1914(e) requires the equipment operator to visually examine mobile equipment before the equipment is placed in operation. Must the equipment operator complete the training program required under § 75.1915?

A. No.

Q. When testing is being conducted of temperature sensors, such as the engine temperature shutdown or the exhaust temperature shutdown, may the mine operator conduct the test at the mine maintenance shop, and then send the tested units underground to replace existing temperature shutdown units on machines in the mine?

A. Yes. The rule does not specify a location where these tests must be conducted, only that the tests be conducted at the required intervals.

Q. Will MSHA or the manufacturer approve the checklists for examinations of diesel-powered equipment, and what will the process be for getting such checklists approved?

A. MSHA is in the process of developing permissibility checklists to be used to conduct the weekly equipment examinations of part 36-approved diesel equipment required under § 75.1914. MSHA has reviewed existing permissibility checklists that are part of the documentation for equipment that has already been approved by MSHA under part 36. MSHA has identified the specific items to be covered during the examination, and forwarded this information to manufacturers of the great majority of diesel equipment used underground, for the manufacturers' review. MSHA intends that the scope of the weekly examinations of diesel-powered equipment under § 75.1914 will be similar in scope to the weekly examinations of electrical equipment performed under existing regulations.

MSHA anticipates that equipment manufacturers will be submitting modified checklists to the Agency for review and incorporation into their equipments' approval documentation. Although equipment manufacturers are responsible for making the revised checklists available to their customers, MSHA has begun to publish lists of the approval numbers of equipment whose checklist have been modified through this process. MSHA has also prepared a generic weekly checklist, which can be used for equipment without revised checklists or can supplement existing permissibility checklists until they have been revised.

Q. Section 75.1914(f)(1) requires diesel-powered equipment to be examined weekly. Are tests required on equipment that has not run in the last week?

A. MSHA takes a very broad view of what equipment is subject to weekly examination, and considers all equipment not located in maintenance shops or surface storage areas as being subject to weekly examinations. Equipment that remains in the mine and that could be operated at any time, even if it has not been operated for an extended period, is subject to the weekly examination requirement.

Q. What is an example of a checklist that would be acceptable to the Agency?

A. MSHA intends to approach this issue so that the scope of the weekly examinations of diesel-powered equipment under § 75.1914 is similar in scope to the weekly examinations of electrical equipment performed under existing regulations. MSHA has identified generically the items in existing permissibility checklists that should be included as part of the weekly examination of permissible diesel-powered equipment. These criteria are set forth below.

Power System Checklists:

1. All visual inspection checks involving the intake system and exhaust system (e.g., gasket installation, bolts in place and tight, no loose connections, cracks and missing port plugs, etc.)
2. Engine stop button is operational.
3. No air system leaks.
4. Low Water Shutdown Test.
5. High Exhaust Gas Temperature Sensor test for dry systems and scrubber systems with exhaust particulate filters.
6. Emergency Air Intake Shutoff Valve test.
7. On-board diagnostic vacuum and pressure gage measurements.

Machine Checklist:

1. All checks involving the fuel system.
2. Service and Park Brake Test and/or Brake Adjustment Check.
3. Fire Extinguisher and Fire Suppression System Check.
4. Main air pressure gage is operational.
5. Approval plate is attached.
6. Neutral start feature test.
7. Exhaust diffuser installed.
8. Diesel particulate filter checks.
9. Warning gong operational check.
10. Platform free fall prevention test.

Electrical Permissibility Checklist

All visual and feeler gage inspection checks involving the electrical components, cables/conduit, lead entrances (packing gland).

The preamble to the final rule also states that MSHA would consider a mine operator to be in compliance with this provision if operators develop their own checklist formats based on and consistent with approved checklists and the manufacturer's maintenance manuals.

Q. Will any special testing procedures (in addition to permissibility checklists) be required on rebuilt engines prior to returning them to service underground?

A. Equipment including rebuilt engines and equipment must be maintained in approved condition.

Q. Are the weekly examinations by a qualified person to be conducted every 7 days, or is during the calendar week (as the current MSHA Program Policy Manual provides for electrical examinations)?

A. The approach for weekly examinations for diesel-powered equipment would be the same as weekly examinations for electrical equipment – weekly examinations must be conducted once during the calendar week.

Q. Does the final rule require a record to be kept of the examination of diesel-powered equipment?

A. The final rule requires that persons performing weekly examinations and tests of diesel-powered equipment make a record when the equipment being examined or tested is not in approved or safe condition. The record must include the equipment that is not in approved or safe condition, the defect found, and the corrective action taken.

Q. How should a mine operator address a defect found on a piece of diesel-powered equipment during the weekly examination?

A. If it is a defect that renders the machine unsafe or not in approved condition, the defect must be corrected or the machine removed from service. The operator must also make a record of the defect, and indicate what corrective action has been taken.

Q. Is the calibration gas (CO) used to perform the weekly undiluted emissions tests under § 75.1914(g) on diesel-powered equipment required to be 2500 parts of CO per million parts of air?

A. No. The CO concentration of the calibration gas used to perform the emissions tests under §75.1914(g) should be whatever concentration is recommended by the manufacturer of the sampling device. The 2500 parts per million concentration referred to in paragraph (g)(4) is a limit on the CO concentration of the exhaust gas established in the test procedures for Category B engines in subpart E of part 7 of the final rule.

Q. What is the maximum concentration of CO that the final rule allows to be measured during the undiluted exhaust emission test under § 75.1914(g) before the equipment is required to be taken out of service or corrective action taken?

A. Corrective action should be taken when changes in the concentrations of CO measured in the machine's undiluted exhaust emissions indicate that the machine's engine is experiencing a problem and is in need of repair or maintenance. The standard operating procedures that mine operators are required to develop for the undiluted exhaust tests are required by §75.1914(g)(4) to specify the concentration or changes in concentration of CO that will indicate a change in engine performance. Concentrations of CO shall not exceed 2500 parts per million, which is the limit for CO established in the test procedures for Category B engines in subpart E of part 7 of the final rule.

Q. A diesel-powered locomotive is used for heavy-duty work only for limited and discrete periods several times a year, i.e., to move shields during longwall moves. During the rest of the year the equipment is used only for light-duty work, i.e., to move supplies. The locomotive will be provided with all of the equipment features required for heavy-duty equipment under §75.1909. Must the equipment undergo the undiluted exhaust emissions tests required by §75.1914(g) every week, regardless of whether the equipment is being used for heavy-duty work in that week?

A. The undiluted exhaust emissions test required under §75.1914(g) would only be required in those weeks when the equipment is used to perform heavy-duty work. However, MSHA recommends that the emission test be conducted in the week immediately preceding any week that the equipment will be used to perform heavy-duty work, to eliminate any question as to whether the requirement has been satisfied.

Additionally, it should be noted that the intent of this requirement is to monitor engine performance to determine when engine maintenance is necessary. Conducting this test intermittently or only a few times a year may not provide adequate data for this evaluation, particularly since the records of these tests are not required to be maintained for longer than a year. Mine operators should take these factors into account in developing their testing and evaluation procedures.

Q. Would it be possible to perform the weekly undiluted exhaust emissions test under §75.1914(g) on permissible equipment while running the equipment engine at maximum rpm to unload coal at the <u>feeder</u>?

A. The final rule simply requires the emissions test be conducted while the engine is operating under load. If this approach satisfies that requirement, there is no reason why this method could not be used in performing this test.

Q. Do samples required under §75.1914(g) for the repeatable loaded engine test have to be instantaneous? We have an Industrial Scientific gas analyzer that averages a sample over 1 minute. Is this acceptable?

A. The undiluted exhaust emissions tests under §75.1914(g) are not required to be instantaneous. However, the test methodology should be integrated into the standard operating procedures, and the procedures should indicate how the mine operator intends to interpret the results of the reading.

Q. How will the undiluted exhaust gas tests required under §75.1914(g) be conducted without endangering persons who have to stand in front of a vehicle under power? How do you safely achieve a loaded engine condition? And how do you accurately repeat this condition?

A. A person does not have to stand in front of a vehicle to perform the exhaust tests under paragraph (g). The Center for Diesel Research has developed guidelines for performing these tests. These guidelines are intended to serve as the basis for the standard operating procedures developed by the mine operator, and it is the mine operator's responsibility to ensure that these tests are conducted in a safe manner. The Center for Diesel Research's report (*An Emissions-Assisted Maintenance Procedure for Diesel-Powered Equipment. "Evaluation of Technology to Reduce Diesel Particulates")* is available via MSHA's Internet Home Page. Until then, hard copies of the report can be obtained by contacting Mrs. Judy Coulter at 304-547-2012, by telefax at 304-547-2071, or by e-mail at coultejl@msha.gov.

Q. Where are weekly carbon monoxide samples collected under §75.1914(g) to be taken?

A. The samples required under paragraph (g) must be of the undiluted untreated exhaust emissions, which means that emission samples must be taken directly from the tailpipe, not at any distance away.

Q. Is the undiluted exhaust test required on light-duty equipment?

A. No. The requirement for the weekly repeated loaded engine condition test applies only to permissible and heavy-duty nonpermissible equipment. The requirement for this test is limited to permissible and heavy-duty nonpermissible equipment because almost all of those types of equipment has a torque converter type transmission that can be used to apply the loaded repeatable test. Most light-duty equipment has a clutch, and a test method has not been developed for that type of equipment.

Q. How do you open the exhaust system on permissible diesel-powered equipment to conduct the undiluted exhaust emissions tests required under § 75.1914(g) without affecting the permissibility of the equipment?

A. All part 36-approved equipment is provided with an exhaust backpressure test port, usually a pipe plug in the exhaust manifold. This port can be used for testing the engine's exhaust emissions. It should be noted that this test should be conducted outby in fresh air, so that the exhaust system does not create an explosion hazard.

Some equipment has already been approved under part 36 that is equipped with an explosion-proof quick disconnect port. This feature provides a ready connection for sampling instruments, and may even permit continuous exhaust gas monitoring.

Q. What are the recordkeeping requirements for the undiluted exhaust emissions test under § 75.1914(g)?

A. The final rule requires the mine operator to develop and implement written procedures for weekly testing and evaluation of undiluted exhaust emissions from diesel-powered equipment used where permissible electrical equipment is required, and from heavy-duty nonpermissible equipment as defined in §75.1908(a). Section 75.1914(g)(5) requires that the testing and evaluation procedures address the maintenance of records that are necessary to track engine performance. These records are required to be maintained in accordance with the requirements of paragraph (h), which, among other things, specifies a 1-year record retention period.

Section 75.1915 – Training and qualification of persons working on diesel-powered equipment

Q. May mine operators conduct this training in-house?

A. Yes

Q. The final rule requires the mine operator to develop a diesel training and qualification program. Does MSHA approve that program?

A. No. The regulations do not require MSHA approval of the training and qualification program.

Q. Do the regulations specify minimum requirements for the training and qualification program?

A. Yes. The regulations provide that the training and qualification program: 1) be in writing; 2) be presented by a competent instructor; 3) include an examination that requires demonstration of the ability to perform all assigned tasks with respect to diesel-powered equipment maintenance, repairs, examinations, and tests; and 4) address specific areas, including proper maintenance of approved features of diesel-powered equipment.

Q. What is the amount of time required for the diesel training?

A. The regulations governing diesel training and qualification programs are performance-oriented, and do not specify the amount of time that must be devoted to diesel training. Instead, the regulation provides that the training and qualification program must be "sufficient to prepare or update a person's ability to perform all assigned tasks with respect to diesel-powered equipment maintenance, repairs, examinations, and tests."

Q. What type of documentation is required under this section?

A. A mine operator is required to maintain: 1) a copy of the training and qualification program; and 2) a record of the names of all persons qualified under the program. Both the training program and the record of qualified persons are required to be kept at a surface location of the mine and made available for inspection by authorized representatives of the Secretary and by miners' representatives.

Q. Does the actual name of a person qualified under § 75.1915 to work on diesel-powered equipment have to be listed?

A. Yes. Section 75.1915(c) requires the mine operator to maintain a record of the names of all persons qualified under the training and qualification program.

Q. Is the miners' representative entitled to a copy of the training and qualification program?

A. Yes. Section 75.1915 (c)(2) requires that a copy of the training and qualification program be kept at a surface location of the mine, and be made available for inspection by an authorized representative of the Secretary and by miners' representatives.

Q. Does the instructor who provides the training have to be qualified under § 75.1915?

A. There is no requirement that the person who provides training under §75.1915 also be qualified under §75.1915. The competent instructor could be a person qualified under §75.1915, an instructor from a trade school or college, or a person experienced in diesel maintenance, such as a representative of an equipment or engine manufacturer, or even the chief of maintenance at the mine, provided that the instructor has the necessary technical expertise.

Q. Would an instructor with a diesel maintenance background, and who has been approved by MSHA under the existing training program at our mine, be considered a "competent instructor" under §75.1915?

A. The determination of whether an instructor is "competent" for purposes of §75.1915 is the responsibility of the mine operator, who must ensure that the instructor has the necessary technical expertise to provide the training.

Q. Section 75.1915(b)(4) requires an examination where a person wishing to be qualified to must demonstrate the ability to perform all assigned tasks with respect to diesel-powered equipment maintenance, repairs, examinations and tests. If the individual seeking to be qualified fails the test, may he or she still perform maintenance and repairs on diesel-powered equipment?

A. If the person seeking to be qualified has failed the required examination, he or she would not be a qualified person under §75.1915, and under the regulations would be prohibited from performing maintenance and repairs of approved features of diesel-powered equipment, and of the features required under §§75.1909 and 75.1910, as well as the weekly examinations and testing under §75.1914(f).

Q. Who has final decision on who passes or fails the examination?

A. The mine operator, or other person designated by the mine operator in the training and qualification program.

Q. Can a person who is not qualified under §75.1915 work under the supervision of a person who is qualified under §75.1915, and assist in the maintenance and repair of diesel-powered equipment?

A. Yes, However, the qualified person will be fully responsible for ensuring that all such work has been properly performed.

Q. Is a person who is qualified under §75.1915 to perform maintenance and repairs on diesel-powered equipment only qualified to work on permissible equipment?

A. It depends on what equipment the qualified person has received training for. A qualified person is not required to be trained on a particular type of equipment unless he or she performs work on it. However, a person who is untrained on a particular type of equipment is not a qualified person with respect to that equipment, and my be perform maintenance, repairs, and tests required to be conducted by a qualified person.

Q. How much time will be allowed to have all persons trained and qualified under §75.1915 to perform maintenance and repairs of diesel-powered equipment?

A. All persons who perform maintenance and repairs of specified features of diesel-powered equipment, as well as those persons performing weekly examinations and tests, must be qualified under §75.1915 as of November 25, 1997.

Q. The rule requires retraining "as necessary". How often is this?

A. Mine operators should tailor the frequency of retraining to the conditions and practices at each mine, to ensure that all persons who work on diesel-powered equipment maintain the requisite level of expertise. Factors that could affect the timing of retraining include the frequency with which the qualified person works on specific pieces of diesel equipment; newly developed techniques for performing the required inspections and tests; and any modifications that may have been made to the equipment since the last training. Frequent retraining may be necessary at some mines to ensure that qualified persons retain sufficient skill and knowledge to perform their jobs effectively. At other mines where conditions are less changeable, retraining at greater intervals may be appropriate.

Q. Are equipment manufacturers' representatives and similar specialists required to be trained under this program? What about mechanics in rebuild shops off of the mine property?

A. It depends upon what functions those individuals are performing. It is incumbent on the mine operator to ensure that maintenance and repairs of diesel-powered equipment are performed by persons with the necessary qualifications, and that the diesel-powered equipment in use at their mines is maintained and/or rebuilt in approved and safe condition.

Q. Do the maintenance requirements of §75.1914 and the training and qualification requirements of §75.1915 also cover the integral electrical components of diesel-powered equipment (e.g., lights, alternators/generators, starters, etc.)?

A. Yes. However, maintenance and repair of non-integral electrical components, such as on a generator or a welder that is operated off a diesel-powered engine, would be covered by the electrical equipment requirements in subpart F of part 75.

Q. Are currently trained diesel equipment maintenance personnel "grandfathered" under §75.1915?

A. No. All persons who perform maintenance and repairs of specified features of diesel-powered equipment, or who perform weekly examinations or tests on such equipment, must be qualified under §75.1915 as of November 25, 1997.

Section 75.1916 – Operation of diesel-powered equipment

Q. Does the prohibition against the operation of unattended diesel-powered equipment apply to outby equipment?

A. Yes, this prohibition applies to diesel-powered equipment used anywhere in an underground coal mine.

Q. When is idling part of normal operation? For example, would the prohibition against the unnecessary idling of diesel-powered equipment still allow a person who is fire bossing to get off of a diesel-powered vehicle to mark initials and dates, if the person remains within sight and sound of the idling equipment?

A. The intent of this provision is that equipment parked at any location, including the loading point, will be shut down if it is not used to do work. Any idling of diesel-powered equipment idling must be required in normal mining operations. For example, the idling of six locomotives waiting to unload supplies is not necessary for normal operation, and would be a violation of this requirement. Leaving equipment idling while the operator eats lunch would also be prohibited. On the other hand, the next ram car waiting to be loaded by a continuous miner would not be considered to be idling. Generally, when an equipment operator leaves a machine the machine should be shut off. However, in the fire boss example given, the facts suggest that the idling is necessary for and part of normal mining operations. The machine would therefore not be required to be shut off for the short periods that the operator is off of the machine.

Q. Operators of diesel-powered equipment are frequently within 500 feet of the equipment but not necessarily in the line of sight of the equipment, e.g., rock dusters, fire bosses, pumpers. The equipment operators may be working behind stoppings or curtains for short periods of time. Would that equipment be considered attended?

A. Section 75.1908(c)(1) provides that "any machine or device operated by a miner" is considered attended. This requires a miner to be at the controls of the machine and within close proximity of the diesel engine. Examples would be a scoop operator or a roof bolter operator. Section 75.1908(c)(2) provides that equipment is attended if it is in the direct line of sight of a job site located within 500 feet of the machine, and that job site is occupied by a miner. This is intended to allow the operation of certain portable equipment, such as welders and sealant machines. MSHA does not intend to prohibit, for example, a miner at a job site which is within 500 feet and in the line of sight of the welding machine from performing the welding operation when his view of the welder is obstructed for short periods of time. Conversely, this requirement is not intended to allow a miner to be at the end of a rock dust hose at a job site that is out of sight of the rock dusting machine. The purpose of this requirement is to ensure that a person will be in a position to check the operation of the diesel machine and intervene if for any reason the machine should start to present a hazard, such as in the event of a fault or fire.

Q. Does the final rule require diesel-powered pumps to be attended?

A. Yes. Section 75.1916(e) provides that diesel-powered equipment shall not be operated unattended. This prohibition applies to all diesel-powered equipment.

DEPARTMENT OF MINES, MINERALS AND ENERGY

Board of Coal Mining Examiners

4 VAC 25-20-10 et seq. Board of Coal Mining Examiners Certification Requirements.
Statutory Authority: §§ 45.1-161.28, 45.1-161.29, 45.1-161.34 and 45.1-161.35 of the Code of Virginia.
Effective Date: August 20, 1997.

CHAPTER 20.
BOARD OF COAL MINING EXAMINERS CERTIFICATION REQUIREMENTS.

PART 1.
GENERAL AND SPECIFIC REQUIREMENTS FOR CERTIFICATION

4 VAC 25-20-10. (Repealed.)
4 VAC 25-20-15. Definitions.

A. This chapter works with the Virginia Mine Safety Act, Title 45.1 of the Code of Virginia. Refer to §45.1-161. for other definitions related to this chapter.

B. The following words and terms, when used in this chapter, shall have the following meaning unless the context clearly indicates otherwise:

"Appropriately related work experience" means work experience which demonstrates the applicant's skill and level of responsibility in performing tasks, and prepares and equips him to perform in the capacity of a certified person.

"BCME" means Board of Coal Mining Examiners.

"Chief" means the Chief of the Division of Mines.

"DMME" means the Department of Mines, Minerals and Energy.

"Division" means the Division of Mines.

"DMLR" means Division of Mined Land Reclamation

"EMT" means emergency medical technician.

"GCM" means general coal miner.

"MSHA" means the Mine Safety and Health Administration

"Virginia coal mine safety regulations" mean 4 VAC 25-50-10 through 4 VAC 25-120-10.

"Virginia Mine Safety Act" means Chapters 14.2 (§ 45.1-161.7 et. seq.) through 14.6 (§ 45.1-161.304 et seq.) and Chapter 18 (§ 45.1-221 et seq.) of Title 45.1 of the Code of Virginia.

4 VAC 25-20-20. General requirements.

A. Applicants shall submit the Application for Certification Examination, Form DM-BCME-1.

B. Applicants shall submit the Verification of Work Experience Form DM-BCME-2 and documentation of experience for approval by the chief if required for the certification. This information shall be signed by a company official knowledgeable of the experience of the applicant and shall be notarized.

C. Applicants shall submit a valid standard or advanced first aid certificate or card, first responder card, MSHA Form 5000-23 with the new miner training or annual refresher portion completed, or Emergency Medical Technician certification except where noted. First aid shall be a component of training and examination for all certifications issued by the BCME.

D. Applicants shall submit documentation of all degrees, continuing education, and other training if required for certification.

E. Applicants shall submit a $ 10 fee to take each examination or to retake all or part of an examination. Refer to § 45.1-161.31 of the Code of Virginia for acceptable forms of payment.

F. The Application for Certification Examination and the applicable fees shall be submitted at least five working days prior to the examination.

G. Applicants shall fulfill the requirements of this section and accumulate the required years of experience no later than five years after passing the examination.

H. Those applicants not meeting the requirements of subsection G of this section shall begin the application process again, submitting a new application, taking the examination again, and paying the fee. A work experience form shall only be submitted if the applicant needs to update information.

I. Certificate holders shall notify the division office within 90 days of a change in their name, their mailing address, or the status of any certification required by this chapter. Failure to do so may prevent the division from notifying the certificate holder of the certification requirements. The last known address reported to the division will be sued to mail notices and information.

J. The division shall mail notices to certificate holders which state the deadline for completion of requirements and the conditions under which the certificate may be suspended or revoked.

4 VAC 25-20-30. Examination requirements.

A. Applicants for first class mine foreman, surface foreman, surface blaster, and underground shot firer certifications shall score at least 85% on each section of the written examination. Applicants for all other certifications shall score at least 80% on each section of the written examination.

B. If all or part of an examination is failed, then the applicant shall wait at least 10 working days after the notification letter has been sent before retaking the failed section or sections.

C. If a section of the examination is failed a second time, then the applicant shall wait at least 10 working days after the notification letter has been sent before retaking the entire examination.

D. If the examination is failed on the third try, then the applicant shall wait the greater of one year from the date of the first examination or 10 working days after the notification letter has been sent before he may begin the examination cycle again.

E. If one year passes prior to the third take of the examination, the certification cycle shall start over with a new application, fee, and examination. A work experience form shall only be submitted if the applicant needs to update information.

F. An examination may not be taken more than three time in one year.

G. Applicants for certifications shall also pass the gas detection examination unless already certified in gas detection except as noted in the certification requirements in Part II (4 VAC 25-50-50 et seq.) of this chapter.

4 VAC 25-20-40. Requirements for reciprocity.

A. Reciprocity shall be available for persons certified by states which accept the corresponding Virginia certifications and show certification requirements are substantially equivalent to Virginia's.

B. If reciprocity is requested by a person certified in another state which accepts the corresponding Virginia certification, a current copy of the pocket card or certificate, and documentation from the other state shall be submitted in addition to fulfilling the requirements in 4 VAC 25-20-20.

C. Applicants for a surface blaster certification shall pass any other examinations required by the DMLR with a score of at least 85% and meet any corresponding DMLR requirements.

4 VAC 25-20-45. Approval of continuing education programs and sponsors.

A. Colleges, universities, training companies, manufacturers, operators, other organizations and persons who wish to sponsor a continuing education program shall submit information to the chief which explains how their program will meet the requirements outlined in this chapter. The request shall include a description of the proposed training, the instructor's name and certification numbers, and the tentative schedule and location. Applicants approved to provide training shall notify the division of the final schedule as soon as is practical.

B. Applicants who wish to have continuing education approved for credit shall submit information o the chief which explains how the training they attended meets the requirements outlined in this chapter. The request shall include a description of the training, the instructors name and certification numbers, and the date time and location of the training.

C. The chief shall notify the applicant in writing of his decision to approve or disapprove the training.

PART II
CERTIFICATION REQUIREMENTS

4 VAC 25-20-50. First class mine foreman.

A. Applicants shall possess five years mining experience, three of which shall be underground, and shall pass the first class mine foreman, map, and gas detection examinations.

B. Applicants shall be given three years credit for a degree in mining engineering from an approved four-year college or two years credit for a degree in mining technology.

C. Applicants shall be at least 23 years of age.

D. Beginning August 20, 1997, certified mine foremen shall complete the continuing education requirements in this section within two years from the date of their certification and every two years thereafter. The holder of the certificate shall submit documentation to the division indicating the required continuing education has been completed prior to these deadlines.

E. The holder of the certificate, in 9rder to receive continuing education credit, shall satisfactorily complete a first class Mine foreman continuing education course approved by the chief and taught by a certified instructor or other instructor approved by the chief.

F. The first class mine foreman shall complete at least four hours of continuing education every two years.

G. The content of the continuing education course shall include, but is not limited to, the:

1. Coal Mine Safety Act, Chapter 14.2 (§ 45.1-161.7 et seq.) of Title 45.1 of the Code of Virginia;
2. Virginia coal mine safety regulations;
3. Responsibilities of first class mine foreman;
4. Virginia coal mine safety policies and division operators' memos; and
5. Review of fatalities and accident trends in Virginia underground coal mines.

H. A maximum of four hours in excess of the required hours may be carried over to the next continuing education

period.

I. Failure to complete continuing education requirements shall result in suspension of a person's certification pending completion of continuing education. If the continuing education requirement is not met within two years from the suspension date, the certification shall be revoked by the BCME.

J. The division shall send notice of any suspension to the last address the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last employer address reported to the division.

4 VAC 25-20-60. First class shaft or slope foreman.

A. Applicants shall possess five years mining work experience at a shaft or slope or appropriately related work experience approved by the chief.

B. Applicants shall pass the first class shaft or slope foreman and gas detection examinations.

C. Applicants may be given three years credit for a degree in mining engineering or two years credit for a degree in mining technology.

4 VAC 25-20-70. Surface foreman.

A. Applicants shall possess five years of surface coal mining experience.

B. Applicants shall pass the surface foreman, first aid, and gas detection examinations.

C. Beginning August 20, 1997, certified persons shall complete the continuing education requirements in this section within two years from the date of their certification and every two years thereafter. The holder of the certificate shall submit documentation to the division indicating the required continuing education has been completed prior to these deadlines.

D. The holder of the certificate, in order to receive continuing education credit, shall satisfactorily complete a surface foreman continuing education course approved by the chief and taught by a certified instructor or other instructor approved by the chief.

E. The surface foreman shall complete at least four hours of continuing education every two years.

F. The content of the continuing education shall include, but is not limited to, the:

1. Coal Mine Safety Act, Chapter 14.2(§ 45.1-161.7 et seq.) of Title 45.1 of the Code of Virginia;
2. Virginia coal mine safety regulations;
3. Responsibilities of surface foreman;
4. Virginia coal mine safety policies and division operators' memos; and
5. Review of fatalities and accident trends in Virginia surface coal mines.

G. A maximum of four hours in excess of the required hours may be carried over to the next continuing education period.

H. Failure to complete continuing education requirements shall result in suspension of a person's certification pending completion of continuing education. If the continuing education requirement is not met within two years from the suspension date, the certification shall be revoked by the BCME.

I. The division shall send notice of any suspension to the last known address of the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last employer address reported to the division.

4 VAC 25-20-90. Underground shot firer.

A. Applicants shall possess tow years coal mining experience underground, one year of the two years shall have included handling and using explosives underground under the direction of a certified underground shot firer, or appropriately related work experience approved by the chief.

B. Applicants shall pass the underground shot firer and gas detection examination.

4 VAC 25-20-100. Underground electrical repairman.

A. Applicants shall possess one year of electrical experience in underground coal mining under the direction of a certified underground electrical repairman or appropriately related work experience approved by the chief.

B. Applicants shall pass the underground electrical repairman and gas detection examinations.

C. Applicants may be given six months credit for electrical educational training from a college, technical school, or vocational school.

D. Applicants who are certified may perform electrical work at underground and surface locations.

E. Continuing education requirements.

1. An underground electrical repairman certification shall remain valid if the certified person meets the MSHA annual retraining requirements (30 CFR 75.153(g)).
2. Submission of a copy of documentation sent to MSHA shall be acceptable to meet this requirement.
3. If a certificate expires because the certificate holder fails to complete the retraining requirements, then the holder of the expired certificate shall meet requirements of Part 1 (4 VAC 25-20-10 et seq.) of this chapter and pass the surface electrical repairman examination prior to reinstatement of certification by the board.

4 VAC 25-20-120. Electrical maintenance foreman (surface and underground).

A. Applicants shall hold a valid electrical repairman certification prior to being eligible to take the appropriate electrical maintenance foreman examination and shall pass the appropriate electrical maintenance foreman examination.

B. Applicants shall possess three years electrical experience as applied to underground mining or appropriately related work experience approved by the chief.

C. Applicants may be given one year credit for an electrical engineering degree, or six months credit for electrical education training from a technical or vocational school.

D. Applicants who become certified may perform electrical work at surface and underground locations.

E. Applicants must meet continuing education requirements in subsection E of 4 VAC 25-20-100 for an electrical repairman.

4 VAC 25-20-125. Electrical maintenance foreman (surface).

A. Applicants shall hold a valid electrical repairman certification prior to being eligible to take the appropriate electrical maintenance foreman examination and shall pass the electrical maintenance foreman examination.

B. Applicants shall possess three years electrical experience as applied to surface mining or appropriately related work experience approved by the chief.

C. Applicants may be given one year credit for an electrical engineering degree, or six months credit for electrical education training from a technical or vocational school.

D. Applicants who become certified may perform electrical work at surface locations only.

E. Applicants must meet continuing education requirements in subsection E of 4 VAC 25-20-100 for an electrical repairman.

4 VAC 25-20-129. Chief electrician (surface and underground).

A. Applicants shall hold a valid electrical repairman and electrical maintenance foreman certification prior to being eligible to take the chief electrician examination and shall pass the appropriate chief electrician examination.

B. Applicants shall possess five years electrical experience or appropriately related work experience approved by the chief and shall meet continuing education requirements in subsection E of 4 VAC 25-20-100 for an electrical repairman.

C. Applicants who become certified may perform electrical work at surface and underground locations.

4 VAC 25-20-130. Chief electrician (surface).

A. Applicants shall hold a valid electrical repairman and electrical maintenance foreman certification prior to being eligible to take the chief electrician examination and shall pass the appropriate chief electrician examination.

B. Applicants shall possess five years electrical experience or appropriately related work experience approved by the chief and shall meet continuing education requirements in subsection E of 4 VAC 25-20-100 for an electrical repairman.

C. Applicants who become certified may perform electrical work at surface locations only.

4 VAC 25-20-140. Hoisting engineer.

A. Applicants shall possess two years of practical mining experience and one year of hoisting experience under the direction of a certified hoisting engineer or appropriately related work experience approved by the chief. A certified hoisting engineer shall verify the hoisting experience.

B. The applicant shall pass the hoisting engineer and gas detection examinations.

C. After the examination has been successfully completed, the applicant shall obtain written permission from a mine official to have a representative from the division observe the applicant's operation of hoisting equipment at the mine. Permission shall be on company stationery, signed by the company official, and submitted to the division.

D. A certified hoisting engineer may act as an automatic elevator operator after completing the on-site demonstration required by 4 VAC 25-20-240 C.

4 VAC 25-20-150. Top person.

A. Applicants shall possess one year of practical mining experience with at least 30 days under the direction of a certified top person or appropriately related work experience approved by the chief.

B. Applicants shall pass the top person, first aid, and gas detection examinations.

C. This certification shall not be used in lieu of any other certification.

4 VAC 25-20-160. Preparation plant foreman.

A. Applicants shall possess five years coal mining experience, at least one year shall be at a preparation plant, or appropriately related work experience approved by the chief.

B. Applicants shall pass the preparation plant foreman and gas detection examinations.

C. Applicants may be given three years credit for a degree in mining engineering or two years credit for a degree in mining technology.

4 VAC 25-20-170. Dock foreman.

A. Applicants shall possess five years coal mining experience, at least one year shall be at a preparation plant, or appropriately related work experience approved by the chief.

B. Applicants shall pass dock foreman and gas detection examinations.

C. This certification shall not be used in lieu of any other certification.

4 VAC 25-20-180. Mine Inspector.

A. Applicants shall possess mining experience as described in § 45.1-161.20 of the Code of Virginia.

B. Applicants shall be given three years credit for a degree in mining engineering from an approved four-year college.

C. Applicants shall hold a valid First Class Mine Foreman Certificate.

D. Applicants shall meet the continuing education requirements of 4 VAC 25-20-50 for first class mine foreman.

E. Applicants shall pass the mine inspector examination.

F. A certificate will not be issued until an applicant is employed by the DMME and shall only remain valid while the person is employed by the department.

4 VAC 25-20-190. Underground diesel engine mechanic.

A. All maintenance work performed on diesel engines used to power equipment in underground coal mines shall be performed by, or under the direct supervision of, a person possessing a Diesel Engine Mechanic Certificate issued by the BCME. In addition, no operator of an underground coal mine in the Commonwealth of Virginia may use diesel-powered equipment in the mine without first employing a diesel engine mechanic who is certified by the BCME.

B. "Maintenance" shall include all of the tasks required to be performed routinely to ensure that the engine exhaust emissions conform with the requirements of the laws and regulations of Virginia and MSHA, and with the maintenance recommendations of the manufacturer of the engine.

C. Applicants shall possess six months experience as a diesel engine mechanic, complete a diesel engine mechanic course approved by the division, or possess appropriately related work experience approved by the chief. A one-year diesel engine mechanic program approved by the division may be substituted for the diesel engine mechanic experience.

D. Applicants shall pass the underground diesel engine mechanic, first aid, and gas detection examinations.

E. The initial training course for diesel engine mechanics shall include at least 32 hours of classroom instruction and be taught by a certified instructor.

F. To qualify for approval by the chief, the content of the initial training course for diesel engine mechanics shall include, but is not limited to:

1. Diesel engine principles;
2. Diesel fuel and fuel systems;
3. Engine exhaust systems;
4. State and federal diesel laws and regulations;
5. Safe use of equipment;
6. Emission controls, testing procedures and recordkeeping; and
7. Protection of health of workers exposed to diesel equipment.

G. The annual continuing education course for diesel engine mechanics shall include at least four hours of classroom instruction and be taught by a certified instructor.

H. The content of the continuing education course shall include, but not be limited to:

1. Diesel technology;
2. State and federal diesel laws and regulations;
3. Safe use of equipment;
4. Protection of the health of workers exposed to diesel equipment; and
5. Required emission test procedures and recordkeeping.

I. A Diesel Engine Mechanic Certificate shall remain valid until December 31 following the anniversary date of the initial training, providing the certification requirements are met, unless the certificate is revoked by the BCME.

J. The holder of the certificate shall renew the certificate by satisfactorily completing a diesel engine mechanic continuing education course approved by the chief and taught by a certified instructor.

K. The holder of the certificate shall submit documentation to the division indicating the required continuing education has been completed before the expiration of the card.

L. Failure to complete the required education shall result in suspension of certification pending completion of continuing education. If the continuing education requirement is not met within two years from the suspension date, then the certification shall be revoked by the BCME.

M. The division shall send notice of any suspension of the last known address that the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last known employer address.

4 VAC 25-20-200. Diesel engine mechanic instructor.

A. Applicants shall have teaching experience and be a certified diesel engine mechanic or possess appropriately related work experience approved by the chief.

B. Applicants shall maintain the certificate by teaching at least one approved diesel engine mechanic course every two years or at least one approved diesel engine mechanic continuing education course every year.

C. Documentation shall be submitted to the division indicating the required teaching has been completed.

D. Failure to complete the required teaching shall result in suspension of the certification. Applicants may meet the teaching requirement by teaching under the supervision of a certified diesel mechanic engine instructor. If the teaching requirement is not met one year from suspension, then the certification shall be revoked by the BCME.

E. The division shall send notice of any suspension of the last known address that the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last known employer address.

4 VAC 25-20-210. Advanced first aid.

A. Applicants shall complete a 24-hour advanced first aid class, at minimum, taught by a certified advanced first aid instructor or posses appropriately related work experience approved by the chief and pass the advanced first aid examination.

B. Approved advanced first aid classes shall cover the following subjects:

1. Introduction to first aid;
2. Respiratory emergencies and cardiopulmonary resuscitation; i.e., heart saver or other four-hour equivalent;
3. Removal of foreign bodies from the throat (the Heimlich Maneuver);
4. Wounds;
5. Shock;
6. Specific injuries including head and chest;
7. Contamination, infection, and prevention;
8. Burns;
9. Cold exposure and frost bite;
10. Bone and joint injuries;
11. Dressings and bandages;

12. Sudden illness;
13. Emergency underground rescue and transfer;
14. Unusual rescue situations related to mining;
15. Poisoning, toxic and hazardous materials;
16. Transportation of victims; and
17. Heat exposure.

C. Certified persons shall complete four hours continuing education annually, which is taught by a certified advanced first aid instructor, to maintain their advanced first aid card. This continuing education requirement shall include re-certification in CPR.

D. The holder of the certificate shall submit documentation to the division indicating the required continuing education has been completed.

E. Applicants holding a valid EMT card or EMT first responder card shall be deemed eligible to receive advanced first aid certification without having to complete the initial advanced first aid class or without passing the advanced first aid examination. All applicants shall complete eight hours of continuing education. The advanced first aid certification shall start on the day the applicant's EMT certification or EMT first responder certification expires.

F. Failure to complete required continuing education shall result in suspension of the certification pending completion of the continuing education. If the continuing education requirement is not met within one year from the suspension date, the certification shall be revoked by the BCME.

G. The division shall send notice of any suspension to the last known address of the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last known employer address.

4 VAC 25-20-220. Advanced first aid instructor.

A. Applicants shall be certified as an advanced first aid instructor by the American Red Cross, National Safety Council, Virginia Emergency Medical Services, or as otherwise approved by the chief. Applicants shall also be certified in cardiopulmonary resuscitation by the American Heart Association of the American Red Cross.

B. The holder of the certificate shall submit documentation to the division indicating that they have continued their certification as required by subsection A of this section or by teaching one initial or refresher first aid training course for DMME within a two-year period.

C. Failure to maintain a certified advanced first aid instructor's certification will result in suspension of the applicant's BCME certification. Applicants may meet the teaching requirement by teaching under the supervision of an advanced first aid instructor. If the certification is not renewed within one year from the suspension date, the certification shall be revoked by the BCME.

D. The division shall send notice of any suspension to the last known address of the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and the last known address of the employer.

4 VAC 25-20-230. Surface facilities foreman for shops, labs and warehouses.

A. Applicants shall possess one-year work experience at a shop, lab or warehouse or appropriately related work experience approved by the chief.

B. Applicants shall pass the surface facilities foreman and gas detection examinations.

C. This certification shall not be used in lieu of any other certification.

4 VAC 25-20-240. Automatic elevator operator.

A. Applicants shall possess one year mining experience or appropriately related work experience approved by the chief.

B. Applicants shall pass the automatic elevator operator and gas detection examinations.

C. The applicant shall obtain written permission from a mine official to have a representative from the division observe the applicant's operation of an automatic elevator at the mine. Permission shall be on company stationery, signed by the company official, and submitted to the division prior to the scheduled observation. The applicant shall demonstrate proper use of the equipment.

4 VAC 25-20-250. Gas detection qualification.

A. The applicant shall demonstrate the proper use of gas detection equipment and shall pass the gas detection examination.

B. The general requirements of 4 VAC 25-20-20 shall not apply except the applicants shall complete Form DM-BCME-1.

4 VAC 25-20-255. General coal miner (GCM) surface and underground.

A. Applicants employed in Virginia coal mines prior to January 1, 1996, who wish to become certified shall:

1. Meet the requirements of Part 1 (4VAC 25-20-10 et seq.) of this chapter.
2. Complete training which shall include highlights of the coal mine safety laws of Virginia and the underground coal mine safety and health regulations of the division and the BCME. The training shall address surface mining requirements for the GCM Surface Certification or underground coal mining requirements for the GCM Underground Certification. The training shall include a demonstration of knowledge or passing of a written examination on Virginia's coal mine safety laws and regulations covering either surface or underground mining. First aid shall be included in the general coal miner training unless applicants submit new miner training or annual refresher training to meet first aid requirements.
3. Submit Form DM-BCME-3, Verification of Training Completed for General Coal Miner Certification, prior to commencing work in a coal mine. The form shall be signed by the employee and the instructor and the date they sign will be the effective date of the General Coal Miner certification.
4. Pass the gas detection examination unless working only on the surface of a mine.

4 VAC 25-20-259. BCME Instructor.

A. Instructors conducting training used to meet requirements of the BCME shall be certified unless otherwise approved in this chapter.

B. To become a certified instructor, the person shall:

1. Submit an application showing applicable mining or instructor experience.
2. Agree to monitoring and evaluation by division instructors and demonstrate the knowledge, skill and ability to conduct training.

C. Final approval for certification shall be based on an evaluation of performance.

D. Applicants shall maintain the certificate by teaching at least one approved certification course every two years.

E. The holder of the certificate shall submit documentation to the division indicating the required teaching has been completed.

F. Failure to recertify shall result in suspension of the certification pending completion of the required teaching. Applicants may meet the teaching requirement by teaching under the supervision of a certified instructor. If the teaching requirement is not met within one year from the suspension date, then the certification shall be revoked by the BCME.

G. The division shall send notice of any suspension to the last known address of the certified person reported to the division in accordance with 4 VAC 25-20-20 1 and to the last known employer address.

PART III
CERTIFICATION REQUIREMNTS FOR MINERAL MINING
(Repealed.)

4 VAC 25-20-260. (Repealed)

4 VAC 25-20-270. (Repealed)

4 VAC 25-20-280. (Repealed)

4 VAC 25-20-290. (Repealed)

4 VAC 25-20-300. (Repealed)

4 VAC 25-20-310. (Repealed)

4 VAC 25-20-320. (Repealed)

4 VAC 25-20-330. (Repealed)

PART IV
ON-SITE EXAMINSTION OF MINE FOREMAN

4 VAC 25-20-340. Examinations.

A. When a mine is issued a closure order or violation related to a hazardous roof or ventilation condition, the mine foreman may be examined to determine his knowledge of the roof control plan and ventilation requirements in the area of his responsibility at the mine. The examination shall be conducted on the surface at the mine site on the day the violation or closure order is issued.

B. The chief shall develop a pool of no more than 50 questions addressing the areas listed in subsection D of this section, which shall be approved by the BCME. These questions shall be available on request and should be incorporated as part of continuing education and other training for mine foremen.

C. A division inspector shall administer a written examination using 10 questions from the approved pool. The foreman shall answer eight out of 10 questions correctly to demonstrate thorough understanding of the mine's roof or ventilation plans. The inspector shall select questions from the pool which are most relevant to the conditions or practices resulting in the order of closure or violation.

D. The mine foreman may refer to roof control, ventilation, bleeder, or other plans available to him when examined at the surface of a an underground mine. Any mine foreman performing tasks requiring certification or otherwise directing work in ventilation or roof support shall be able to provide the following information:

1. Describe the roof control requirements set out in the mine's roof control plan in the area of the foreman's responsibility.
2. Describe the frequency and methods of any required testing of roof, face and ribs in the area of the foreman's responsibility.
3. Show how the roof control practices in the area of the foreman's responsibility comply with the requirements of the roof control plan.
4. Describe the frequency and contents of any pre-shift, on-shift, and when applicable, weekly examinations of mine ventilation required in the area of the foreman's responsibility.
5. Describe the requirements for action under the mine's fan stoppage plan in the area of the foreman's responsibility.
6. Describe any requirements for face ventilation controls used in the area of the foreman's responsibility.
7. Describe any requirements under the mine bleeder plan in the area of the foreman's responsibility.
8. Describe the requirements for mine ventilation controls such as regulators, ventilation doors, and other similar controls in the area of the foreman's responsibility.

9. Describe the minimum volume of air required in the area of the foreman's responsibility.
10. Describe the minimum requirements for quality of air (oxygen, carbon dioxide, and methane) in the area of the foreman's responsibility.
11. Describe the procedure to follow in the area of the foreman's responsibility upon an accumulation of methane at:
    a. 1.0% or greater not less than 12 inches from the roof, face, ribs, or floor;
    b. Greater than 1.0% in a split that ventilates any group of active areas;
    c. 1.5% (or 2.0% as applicable) in a split of air returning from areas where coal is being extracted or is capable of being extracted; or
    d. 5.0% or greater in any area of the mine.

E. The division inspector completing an examination of a foreman under this part shall discuss the results of the exam with the foreman before leaving the mine.

4 VAC 25-20-350. Actions brought before the BCME.

A. The examination shall be the basis of any enforcement action brought before the board for failure to display a thorough understanding of the roof control plan and ventilation for the area of the mine for which he is responsible.

B. Refusal of the foreman to submit to examination will constitute just cause to be brought before the board and may result in suspension of certification and revocation of certification by the board.

PART V.
GUIDELINES FOR ON-SITE EXAMINATION OF A MINE FOREMAN

4 VAC 25-20-360. Purpose and scope.

A. Section 45.1-161.35 A of the Code of Virginia provides for on-site examination of a mine foreman by a mine inspector to determine that the foreman has a thorough understanding of the roof control plan and ventilation or the area of the mine for which he is responsible. The procedures followed by the inspector in conducting an on-site examination of a mine foreman must be consistent with requirements in Part IV (4 VAC 25-20-340 et seq.) of this chapter. This includes the use of questions approved by the board which are administered in accordance with this chapter.

B. The purpose of examining a mine foreman is to measure and evaluate his knowledge and understanding of mine roof control and ventilating or the areas of his responsibility. Mine foreman are required to demonstrate this and other elements of mine safety when they become certified to act as mine foremen in the Commonwealth of Virginia.

C. As on-site examination by the mine inspector will only be initiated where there is just cause that the foreman has failed to maintain safe roof control and ventilation for his area of responsibility at the mine. Just cause for anon-site examination of a mine foreman by a mine inspector must be based on issuance of an order of closure or violation related to a hazardous condition pertaining to roof control or ventilation.

4 VAC 25-20-370. Determination by the inspector to conduct an on-site examination.

A. An order of closure issued in accordance with § 45.1-161.91 of the Code of Virginia, or notice of violation issued in accordance with § 45.1-161.90 of the Code of Virginia that relate to roof control or ventilation hazards, shall be reviewed at the time it is issued for evidence of mine foreman negligence, which could require on-site examination of the mine foreman by the mine inspector. In making the determination whether or not to conduct an on-site examination, the mine inspector must establish the following:

1. The roof or ventilation hazards cited resulted from performing his duties with less than ordinary care. Ordinary care means the use of such care as a reasonably prudent and careful min foreman could use under similar circumstances.
2. The mine foreman knew or should have known of the existence of the hazardous condition.

B. When these criteria have been established, the mine inspector will undertake an on-site examination of the mine foreman.

4 VAC 25-20-380. Notification of intent to conduct an on-site examination.

A. The mine inspector will notify the mine foreman of an order of closure or notice of violation for a hazardous condition related to roof control or ventilation in the area of the foreman's responsibility. The inspector will let him know that he intends to invoke the provision of the law for an on-site examination of the foreman.

B. The following approach will be taken by the mine inspector in giving notice to the mine foreman.

1. The notification will be given by the inspector in private.
2. The inspector will be courteous and professional in explaining the reason for the on-site examination.
3. The inspector will explain the procedures he will follow in conducting the on-site examination.

4 VAC 25-20-390. Procedures for conducting on-site examination.

A. The on-site examination of the mine foreman will be handled in such a way as to not prevent the foreman from performing his duties. The on-site examination must be conducted, to the extent possible, immediately on arrival outside on the surface on the day the order of closure or notice of violation is issued.

B. These procedures will be followed in conducting the on-site examination:

1. The examination will be administered in a written format.
2. Ten questions selected by the mine inspector will be written out by the mine inspector on paper for use in the on-site examination.
3. The mine inspector will choose the 10 questions from the approved pool.
4. The mine inspector will choose the 10 questions related to the condition or practice being cited by the order of closure of notice of violation.
5. The mine foreman will be provided sufficient time to write out his answers to the questions. He may refer to plans or other information available to him. However, no other person may assist him in answering the questions. The mine inspector will remain with the mine foreman during the written examination.
6. The mine inspector will read the questions being asked to the mine foreman if requested and should answer any questions from the mine foreman which could help to clarify his understanding of the questions.
7. The mine foreman may respond to the questions orally. In this case, the mine inspector will record the response of the mine foreman to each question of the examination form, have the foreman sign the form as accurately representing the response, and provide the mine foreman a copy promptly upon completion.

4 VAC 25-20-400. Results of the on-site examination.

A. The mine inspector will promptly check the responses given by the mine foreman for each of the 10 questions asked. At least eight of the 10 questions must be answered correctly to successfully complete the on-site examination. The results of the on-site examination will be reviewed promptly with the mine foreman. A copy of the written on-site examination completed by the mine foreman will be provided to him promptly by the mine inspector.

B. The circumstances related to the on-site examination of the mine foreman, including pass or fail results, will be described in the inspector's report, and will be reviewed as part of the closeout of the scheduled inspection activity for the mine.

C. The chief will notify the mine foreman and mine operator in writing of the petition to the BCME for a formal hearing. Should a petition for a hearing be requested, the hearing would be conducted in accordance with part VI (4 VAC 25-20-410 et. seq.) of this chapter.

D. If a foreman successfully appeals a violation which resulted in an on-site evaluation and further established to the BCME that he had a thorough knowledge of such plans, then the failure of the on-site examination shall bee used in any other revocation against the foreman.

PART VI
HEARING PROCEDURES

4 VAC 25-20-410. Prehearing procedures.

A. Any person wishing to bring any matter before the board shall use these procedures except for good cause shown before the board.

B. Petitions for action by the board shall be in writing, shall state the grounds for the petition before the board, shall state the relief sought, and shall include any applicable supporting material, as set out below:

1. For certification to be revoked in accordance with § 45.1-161.35 B of the code of Virginia, the petitioner or petitioners shall submit specific charges which set forth the reasons why the certification should be revoked.
2. To request a reexamination for a certificate revoked pursuant to § 45.1-161.35 of the Code of Virginia, the holder of the revoked certificate shall submit a request for reexamination with evidence that the cause for revocation of his certificate has ceased to exist.
3. For other petitions before the board, the petitioner shall submit a written petition explaining the request being made and the relief being sought.

C. The division shall assign a docket number to all petitions before the boards. The division shall provide written notice to all parties to any proceeding in accordance with § 45.1-161.35 D of the code of Virginia and the Administration Process Act (§ 9-6.14:1 et seq. Of the Code of Virginia).

D. Persons wishing to address the board, except those making a petition for board action, will be provided an opportunity at the conclusion of the board meeting.

E. Persons shall make any request for change to the board's regulations in accordance with the DMME and the board's Public Participation Guidelines, 4 VAC 25-10-10 et seq.

4 VAC 25-20-420. Conduct of formal hearings.

A. All hearings shall be heard during scheduled meetings of the board, on a case-by-case basis, in the order the petitions appear on the docket.

B. Hearings shall be held in the DMME, Big Stone Gap office, unless a different location is agreed to by mutual consent of the parties to the hearing and the Chairman of the BCME.

C. Hearings requiring case decisions shall be recorded.

D. Each party may be represented by an individual of choice or legal counsel.

E. The chairman, with the concurrence of the majority of the board present at a hearing, shall have the authority to limit evidence to that relevant to the issues. Any proofs, rebuttal, and cross examination which are immaterial, insubstantial, privileged, or repetitive may be excluded.

F. The chairman may continue, adjourn and reconvene the hearing as necessary.

G. Decisions of the board shall be made based on a preponderance of the evidence placed before it.

4 VAC 25-20-430. Post hearing procedures.

A. The board may require submittal of briefs from the parties to a hearing concerning the issues of record before the board. The board shall schedule submittal of briefs at the time of the hearing.

B. Transcripts of the proceeding shall be provided on request to any party to the hearing at cost. Motions to correct any transcript shall be filed within 10 working days after delivery of the transcript, and shall be ruled on by the chief

within 10 working days after his receipt of the motion. Any corrections shall be sent to all parties to the hearing who have received a copy of the transcript.

C. Decisions shall be rendered in writing and communicated to parties to the proceeding in accordance with the Administration Process Act (§ 9-6.14:1 et seq. Of the Code of Virginia).